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AN EDUCATIONAL ORDER TRIAL ON 10.5-OUNCE SHRINK-RESISTANT WOOL FLANNEL SHIRTING*

LOUIS I WEINER and FRANK J RIZZO
Quartermaster Research and Development Laboratories, Textile and Leather Division, Philadelphia, Pa

A summary is given of the success achieved in the Quartermaster Corps' educational procurement of shrink-resistant shirting. This small-scale run, participated in by many finishers and producers of shrink-resistant compounds, proved the feasibility of treating this particular fabric for shrink resistance and also afforded contractors an advance opportunity to learn by actual experience the production problems involved. The report emphasizes the difficulties encountered, especially as to stiffness, aging, shade, and colorfastness. The results show the quality level met by each contractor (represented by code designation) for each pertinent characteristic.

I INTRODUCTION

EARLY investigations by the Quartermaster Corps of shrink resistant processes for wool were confined to hosiery and other knitted wool items which presented serious felting problems because of frequent laundering. In 1943 antifelt treatments were made mandatory in specifications for Socks, Wool Cushion Sole, and Socks, Wool Ski. Later such requirements were established for sweaters and other knit outerwear. Industrial promotion of shrink resistant treatments for wool in this country followed a similar pattern.

Toward the end of World War II, it began to appear that any one of two or three commercially available shrink resistant processes could also be applied to woven fabrics. An intensified research program was then initiated by the Quartermaster Laboratories to adapt these treatments to the processing of wool shirting fabric. At the time this fabric presented the most serious laundering problem of all the woven fabrics used in Army clothing. These early processes used a resin or resin-like material. While they were satisfactory from the standpoint of shrink resistance, the quantities of resin necessary and the nature of the resins tended either to stiffen the fabric markedly or else to predispose it to stiffening after a relatively short period of storage.

During 1946 and 1947 a gradual transition took place in the quality and type of available processes. Improvements were made in resins so that smaller quantities were needed to achieve satisfactory felting resistance. Also techniques were evolved for the utilization of top- and yarn-chlorinated materials in the manufacture of woven fabrics. In addition, piece chlorination treatments were gradually being improved. One chlorination treatment in particular showed satisfactory performance under most conditions of use.

During this period considerable experimentation was conducted by the Quartermaster Laboratories in cooperation with industry to work out proper formulations for the 10.5-ounce shirting, using all the available shrink resistant processes. Extensive field testing was conducted to determine how the treated shirting fabrics would perform under field conditions. In addition, extensive laboratory development work was carried out to evolve effective and reproducible test methods for gaging the performance characteristics of the treated shirting. Finally, this effort culminated in September 1948 in the issuance of a report (*1*) describing the recommended test methods for evaluating shrink resistant shirting, and in April 1949 Quartermaster Corps Tentative Specification PQD 900, for Cloth, Wool, Flannel, 10.5-ounce Shrink Resistant was issued.

The applicable test methods and the tentative specification were widely circulated to the sponsors of shrink resistant processes, to shrink resistant processors and members of the worsted industry for study and comment.

It became apparent that only a very limited amount of technical "know-how" existed and that manufacturers were reluctant to offer large quantities without first having determined the feasibility of meeting the specification requirements on a production basis.

The Quartermaster Corps, accordingly, initiated an educational order program involving 40,000 yards of the treated shirting in the OD 33 and Blue 84 shades. The quantity awarded to any one bidder was limited to 2000 yards for any one color, or any one process, to obtain as wide a participation in this program as possible.

The worsted industry welcomed this program enthusiastically and made a gratifying response to the invitations. A more representative coverage of the available shrink resistant processes and the various types of plants could not have been obtained if they had been hand picked. The offerings included every shrink resistant process that had attained any degree of commercial acceptance in this country. In addition, a complete cross-section of the industry, including producers who had previously bid and produced on government contracts, was represented. Contracts were awarded on the basis of different processes and stages of application. Further, in order to obtain a wide representation of the various segments of the worsted industry, awards were made to plants that

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were completely integrated, having shrink resistant equipment; those that were integrated but had no shrink resistant equipment; and finally, nonintegrated plants with and without shrink resistant treating equipment.

In this report the complete results of the program are summarized. The test data are plotted and the performance of the cloth submitted by each contractor is compared with that of the others and relative values are given indicating the performance of the various treatments. All treatments and contractors are referred to by code number.

In interpreting the significance of these data, the experimental nature of the study should be considered. Instances of obvious failure to meet performance requirements should be recognized as not necessarily attributable to weaknesses of a specific treatment or mode of application of the treatment, or to the contractor or finisher involved, but more to inherent difficulties normally associated with the introduction of a major change in processing techniques. That many of the contractors were able to meet all of the specification requirements in this small procurement is indeed a tribute to the technical competency of the textile industry.

II SHRINK RESISTANT PROCESSES†

The processes in commercial use in the United States today can be roughly divided into two categories—the wet chlorination type and the resin type. Other types have been developed and used but only to a very limited extent. Such processes as the alcoholic-potash process of Freney-Lipson and the dry chlorination process of the Wool Industries Research Association have been tried out in this country on a limited scale but have not received any degree of commercial acceptance.

A. WET CHLORINATION PROCESSES——The wet chlorination processes included in this study were Harriset, Kelpie, Kroy, Sanforlan, and Schollerize. They were applied either to the wool top or to the fabric, and in some instances part of the production on a given award was treated at one stage and part at another, both by the same process.

Harriset: The fabric or top is immersed for a short time (seconds) in a solution containing a wetting agent and available chlorine in the form of hypochlorite. The pH, temperature, and chlorine concentration are regulated by automatic controls and by the use of flowmeters. The wool passes through a pair of squeeze rolls and the action is stopped in a dilute sodium bisulfite solution. After passing through the anti-chlor bath, the wool is squeezed, passed through a series of rinse boxes and then into a conventional drier.

Kelpie: In the Kelpie acid chlorination process, the solution used contains a relatively high quantity of free chlorine and a lesser quantity of hypochlorite and sulfuric acid. The shrink resistant effect is produced by passing the wool through the chlorinating bath continuously and rapidly. The time of immersion is about 30 seconds. The wool then passes through an antichlor rinsing bath and softener. The Kelpie process in this series of experiments was applied to the wool in top form.

Kroy: Kroy is a rapid wet halogenation process. The effectiveness and uniformity of the process are obtained by control of halogen concentration, time, temperature and pH. Any of these may be varied with respect to the others, thus permitting adjustment to a common level of treatment.

Sanforlan: Sanforlan is an alkaline batch chlorination treatment in which potassium permanganate is used as an adjunct. The process is carried out in a top dyeing machine in the presence of wetting agent and buffer. The action is continued until the wool properly exhausts the chlorine and the permanganate as determined by titration. The fabric is then neutralized, cleared, rinsed, dried, and finished in the conventional manner.

Schollerize: In the Schollerize batch chlorination process, the fabric is first acidified and then brought to the proper pH by means of a buffering agent. A buffered solution of calcium hypochlorite is added to the fabric and the bath is allowed to run for 5 minutes, after which an antichlor is added. The bath is then dropped and the fabric rinsed.

B. RESIN PROCESSES —— The resin processes include the thermosetting resins, such as the melamine formaldehydes, and the rubber-like resins, which are primarily polybutadienes. The resin treatments used in these orders included Resloom and Lanaset, which are of the melamine formaldehyde type, and Durlana and Koloc, which are rubber-like in nature.

Durlana: The base material in the Durlana process is a soap emulsion of a prepolymerized resin. The resin is applied to the fabric in a standard dye kettle. The fabric is entered into the kettle, thoroughly wet out, brought to a pH of 5 using acetic acid, and treated with sodium chloride and the required amount of resin. Further additions of acid are made until the resin is completely exhausted. The fabric is then rinsed, cooled, extracted, dried, and finished in the usual fashion.

Koloc: The base material used in the Koloc process is a water emulsion of a prepolymerized resin. The fabric is prepared for treatment by fulling, scouring thoroughly, rinsing, and drying. The fabric is padded with a dispersion of the resin and formic acid in water, adjusted to give a 6% concentration of resin solids on the fabric on a dry weight basis. The fabric is folded and allowed to set for approximately one hour, during which time the resin is exhausted much in the manner of dyestuffs. After exhaustion, the fabric is placed in a dye kettle, thoroughly rinsed, extracted open width through squeeze rolls, and dried in an over-feed dryer operating at a temperature of 250°F.

Lanaset: In the Lanaset process, the cloth is scoured, dried, and passed through a padder containing a colloidal solution of the resin. Approximately 5.5% of resin solids are deposited on the fabric, which is then dried at a temperature of 240°F. After drying, the fabric is washed in soda ash, softened, extracted and redried at a temperature of 240°F.

Resloom: In the Resloom process, the resin is applied to the dry cloth after all of the usual wet finishing operations. The fabric is passed through a padder containing resin (melamine formaldehyde monomer), a catalyst (to insure the polymerization of the monomer) and a wetting agent (to insure thorough penetration and wetting out of the fabric). The speed of application is approximately 16 yards per minute. The cloth is dried at a temperature of 210°F and then cured at a temperature of approximately 300°F. (One of the contractors used a carbonizer which furnished infra-red radiation for the curing). The cloth is then washed in synthetic detergent to remove all the unreacted catalyst, rinsed, dried and finished in the usual way.

III PRODUCTION PROBLEMS

On the basis of preliminary laboratory studies, it was anticipated that where the shrink resistant treatment had been applied at a stage of processing prior to weaving, difficulty might be encountered in finishing, particularly with reference to the surface effect desired.

Accordingly, the results of these findings together with suggested corrective measures were made available to the contractors.

By and large, the problem most frequently encountered in this program was the inability of many of the contractors to meet the established shade tolerances allowed for the fabric. Practically every type of treatment presented its own par-

† Since this work was performed at the end of 1949 and the beginning of 1950 many of the processing techniques described may have been modified. This should be kept in mind in appraising this section of the report.

ticular problem. The rapid strike of dyestuffs in the case of the chlorination treatments, although well known and recognized by the dyer, proved to be a difficult problem to cope with. Variations in pH and acid-base balances among the various treatments undoubtedly contributed to the difficulty encountered here.

During the course of production of the samples, the manufacturers, and particularly the finishers, were frequently contacted to determine the causes of any difficulties that were being encountered in meeting the required shade. In addition, the delivered samples were frequently analyzed and compared with norms for untreated production. Study of this problem in all of its aspects led to the conclusion that most of the difficulties that arose were due more to the vagaries of small scale production than to any specific problem posed by either the chlorinated or resin treated wool.

IV TEST METHODS

In addition to the standard physical tests previously used in evaluating the performance of untreated flannel shirting, several special methods were employed to evaluate the characteristics of the fabric that might be specifically affected by the shrink resistant treatment. These tests are for felting shrinkage, stiffness, aging, and alkali solubility.

SHRINKAGE——Probably one of the most difficult textile test methods to interpret from the standpoint of reproducibility and correlation with end use is the test for shrinkage. The testing of flannel shirting is especially complicated because there are two distinct types of shrinkage (relaxation and felting) which must be taken into consideration. The development from Quartermaster research of reproducible test methods for measuring relaxation and felting shrinkage have advanced the program of shrink resistance and have led to the development of specification requirements that are more realistic than those of the past. The basis for these shrinkage tests has been described elsewhere (*1*).

Essentially the relaxation test consists of soaking the fabric in water, without agitation, for a period of 2 hours, thoroughly extracting in a centrifugal extractor for 5 minutes and drying in a tumbler drier. The unique features of the felting test are control of pH and elimination of soap or detergent. The felting test is performed in a 24-inch diameter horizontal axis washer. The wool specimens and standard ballast are agitated in 4 inches of water (buffered to a pH of 7) at a temperature of 140°F for a period of one hour. The specimens are then contrifugally extracted, dried in a tumbler, sprayed, and pressed. This test has now been used continuously for a period of four years and has consistently demonstrated its value in determining the performance of shrink resistant treated materials.

STIFFNESS——The neecssity for a stiffness test was recognized early in the shrink resistance program when it became apparent that in order to meet the shrinkage requirements of the specification, resins might be used in quantities which would adversely affect the handle of the fabric. Establishment of a clear correlation between stiffness and fabric "handle" presents an almost insuperable problem, since "handle" is a composite of stiffness and other factors such as surface friction and compressibility. However, a test was made in which treated and untreated shirting fabrics were first ranked subjectively from the most flexible to the stiffest, disregarding as far as possible sensations due to surface feel and fabric compressibility, and then were evaluated for stiffness on a Tinius Olsen tester.* A good relationship was found between the subjective rankings and the machine values (*2*).

AGING——Another property of some resin treatments is apparent instability to long-term storage, heat, and ultra-violet radiation. Two aging tests were developed to determine whether the suitability of the treated fabrics had been impaired from this standpoint by the use of unstable materials. Tests showed that fabrics treated with resins sensitive to aging became powdery, changed shade, and stiffened. Increase in stiffness was found to be the simplest method of measuring this response to aging. The aging tests are described in Appendix B.

ALKALI SOLUBILITY —— The alkali solubility test has been accepted as a standard method of evaluating damage to wool caused by oxidative treatments. Although a point-for-point correlation has not been established between alkali solubility and wear, it is known that samples with excessive alkali solubility are often harsh to the touch, deteriorate rapidly in laundering and become slimy when wet. Such fabrics have been reported in the literature (*3*) as abrading more rapidly. The alkali solubility test is described in Specification CCC-T-191b, Method 2800.

COLOR AND COLORFASTNESS—— The shade of the samples was evaluated by standard shade board techniques under artificial light having a color temperature of 7500 degrees Kelvin approximating natural North sky light and also under incandescent lamplight at 2800 degrees Kelvin. Shade swatches representing each roll of cloth produced were evaluated as acceptable or unacceptable, based upon normal tolerances which had been developed for the 10.5-ounce shirting. In addition, photometric measurements were made on samples picked as representative of the outer extremes of the shades delivered. A General Electric Recording Spectrophotometer was used and the curves obtained were integrated, tristimulus values computed, and trichromatic coefficients plotted to furnish an idea of the relative spread of these extreme limit values about the standard.

Fastness to perspiration, wet-dry cleaning and crocking were tested in accordance with standard methods of Federal Specification CCC-T-191b. The fastness to laundering was evaluated by subjecting samples of fabric to multiple cycles of the Army mobile laundering procedure. All samples were laundered together. To achieve uniformity of treatment the bath-to-cloth ratio was cut to ½ of the washer capacity. The fastness to light was determined on five replicates for each fabric exposed in a Model FDAR Fade-Ometer. The OD samples were exposed for 40, 80, and 120 hours and the blues for 40 and 80 hours. Color measurements for both fastness-to-light tests were made on a Hunter Color and Color Difference Meter. The change in color in Judd units was computed using the formula supplied by Richard Hunter (*4*) who developed the method:

$$\Delta E = \sqrt{(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2}$$

where ΔL is the difference in lightness, Δa the difference in amber filter reading, and Δb the difference in blue filter reading.

V RESULTS AND DISCUSSION

The results of the various specification tests made on the treated fabrics are summarized in Table I. The most significant test parameters are presented in graphical form in Figures 1 to 5, inclusive. In each figure the specification requirement is indicated by a broken line drawn perpendicular to the base of the graph. Frequency distribution curves have been drawn which show, for the characteristic measured, the proportion of the pieces tested from all of the contractors falling within the given class interval. The average performance of each contractor is indicated by a code letter at the bottom of the graph. These values represent the average noted for three rolls of the fabric drawn at random from the deliveries of each contractor. A comparison of the areas under the frequency distribution curve on each side of the broken line indicating the specification requirement may be used as an index of the ease with which the contractors as a group met the particular specification requirement.

* Described in Method 5202, Federal Specification Textile Test Methods CCC-T-191b, 15 May 1951.

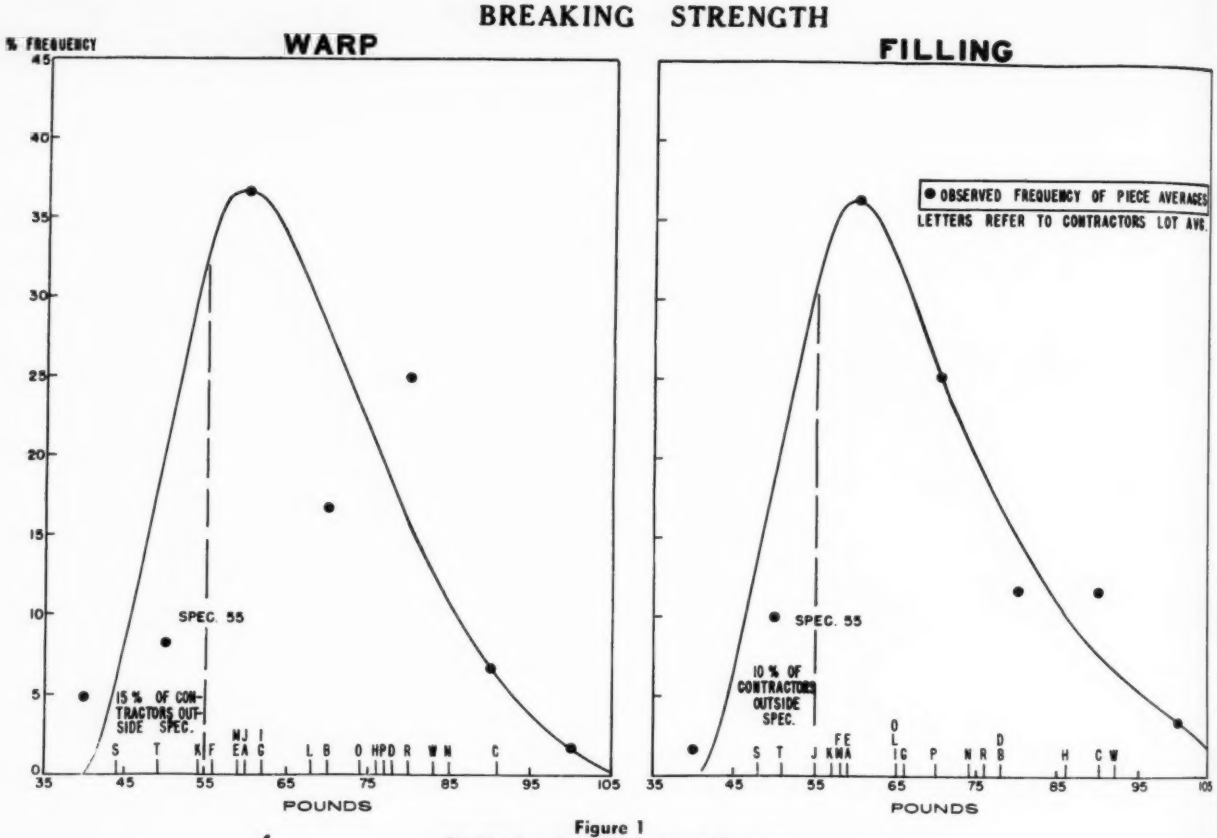

Figure 1
Quality Level of Cloth, Wool Flannel (10.5-oz Shrink Resistant)

TABLE I
CONTRACTORS' PERFORMANCE IN MEETING SPECIFICATION REQUIREMENTS

Test	*Specification*	*Overall Avg*	*Contractors Outside Spec*		
			%	*Letter*	*Lot Value*
1. Breaking strength (lb)					
Warp	Min 55	67	15	K	54
				S	44
				T	49
Filling	Min 55	67	10	S	48
				T	51
2. Weight (oz linear yd)	Min 10.5	10.5	50	E	10.0
				F	10.3
				G	9.9
				H	10.4
				J	10.4
				K	10.1
				M	10.3
				O	10.2
				S	9.6
				T	10.1
	Max 12.6		0		
3. Texture (threads per inch)					
Warp	Min 68	70	0		
Filling	Min 68	69.5	0		
4. Relaxation shrinkage (%)					
Warp	Max 5.0	3.1	10	B	5.4
				O	6.4
Filling	Max 4.0	1.2	10	B	5.1
				G	4.9
5. Felting shrinkage (%)					
Warp	Max 4.0	2.9	10	A	7.5
				F	6.0
Filling	Max 3.0	1.3	5	A	3.5
6. Stiffness (lb)					
Original	Max 0.0030	0.0017	0		
After light aging	Max 0.0040	0.0019	5	K	0.0052
After heat aging	Max 0.0040	0.0027	15	I	0.0058
				J	0.0045
				K	0.0073

BREAKING STRENGTH——The warp and filling breaking strengths are plotted in Figure 1. Three out of the 20 contractors failed to meet either the warp or filling strength or both. In all three instances, the low breaking strength is associated with low cloth weight. There is no evidence in the study of these fabrics to indicate that the shrink resistant treatment produced a significant loss in breaking strength of the fabrics. In fact, it has been observed (5) that some of the chlorination treatments have a tendency to increase the strength of fabrics by increasing the fiber-to-fiber friction in the yarns. While some of the pieces of fabric tested ran as high as 90-100 lb in strength, the great bulk of them clustered just above the specification requirement of 55 lb. The combined average breaking strength for the warp and filling directions was 67 lb.

WEIGHT——As shown in Table I and Figure 2, ten of the contractors, or 50%, failed to meet the minimum weight requirement of the specification. For seven of these ten contractors, who used shrink resistant top, this failure was due primarily to the fact that the weight of the fabrics did not increase as expected in

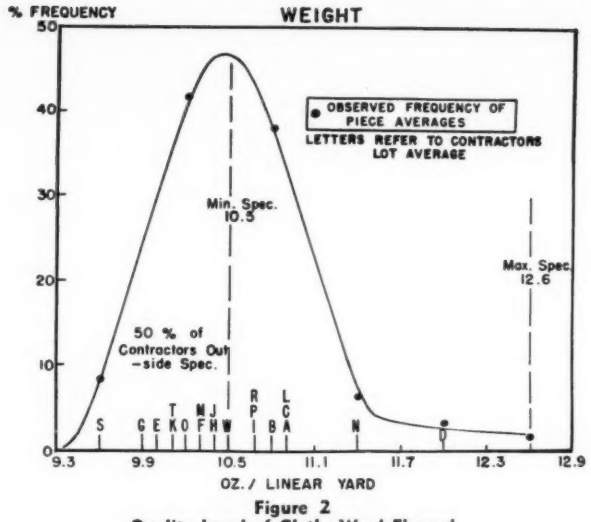

Figure 2
Quality Level of Cloth, Wool Flannel
(10.5-oz Shrink Resistant)

scouring and fulling because of the inherent shrink resistance of the treated wool. For the remaining three who employed piece treatments (two resin types and one chlorination) the failure to meet specification weight requirements may be attributed to vagaries in production in such small yardages of fabric. For larger runs it would appear that proper adjustment and allowances could be made early in production to assure delivery within the proper weight range. None of the contractors exceeded the maximum weight requirement of the specification. The two heaviest fabrics were both produced by contractors who used the melamine formaldehyde type of shrink resistant treatment.

SHRINKAGE——Plotted in Figures 3 and 4 are frequency distribution curves for relaxation and felting respectively. One contractor failed to meet the requirements for both warp and filling relaxation shrinkage, one failed to meet the requirement for warp only, and one for filling only. Since relaxation shrinkage is evaluated by a rather severe procedure involving tumbler drying, this represents a good level of performance. The very low relaxation shrinkages obtained by some of the contractors (in the vicinity of one and two percent) indicates the possibility of producing wool cloth which would not have to be subjected to the normal spong-

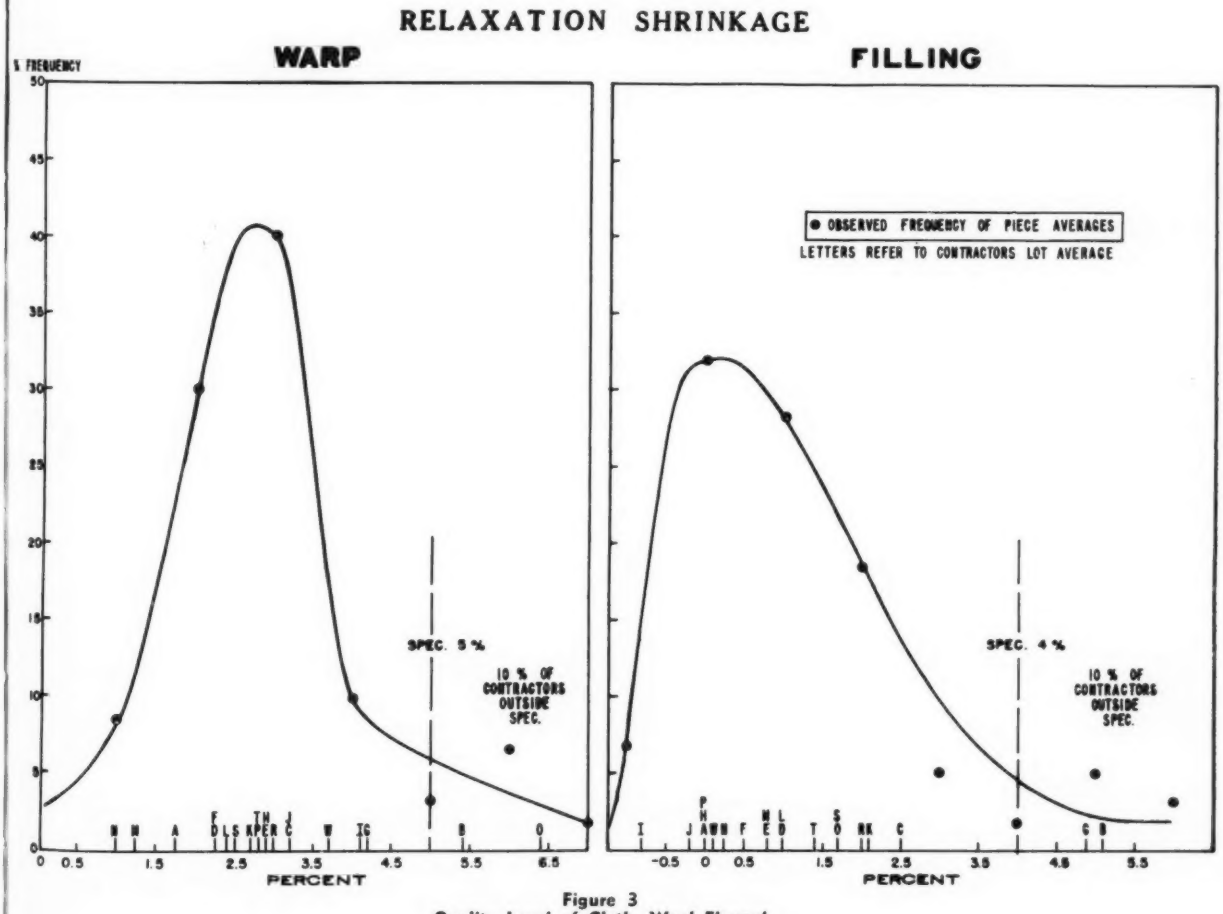

Figure 3
Quality Level of Cloth, Wool Flannel
(10.5-oz Shrink Resistant)

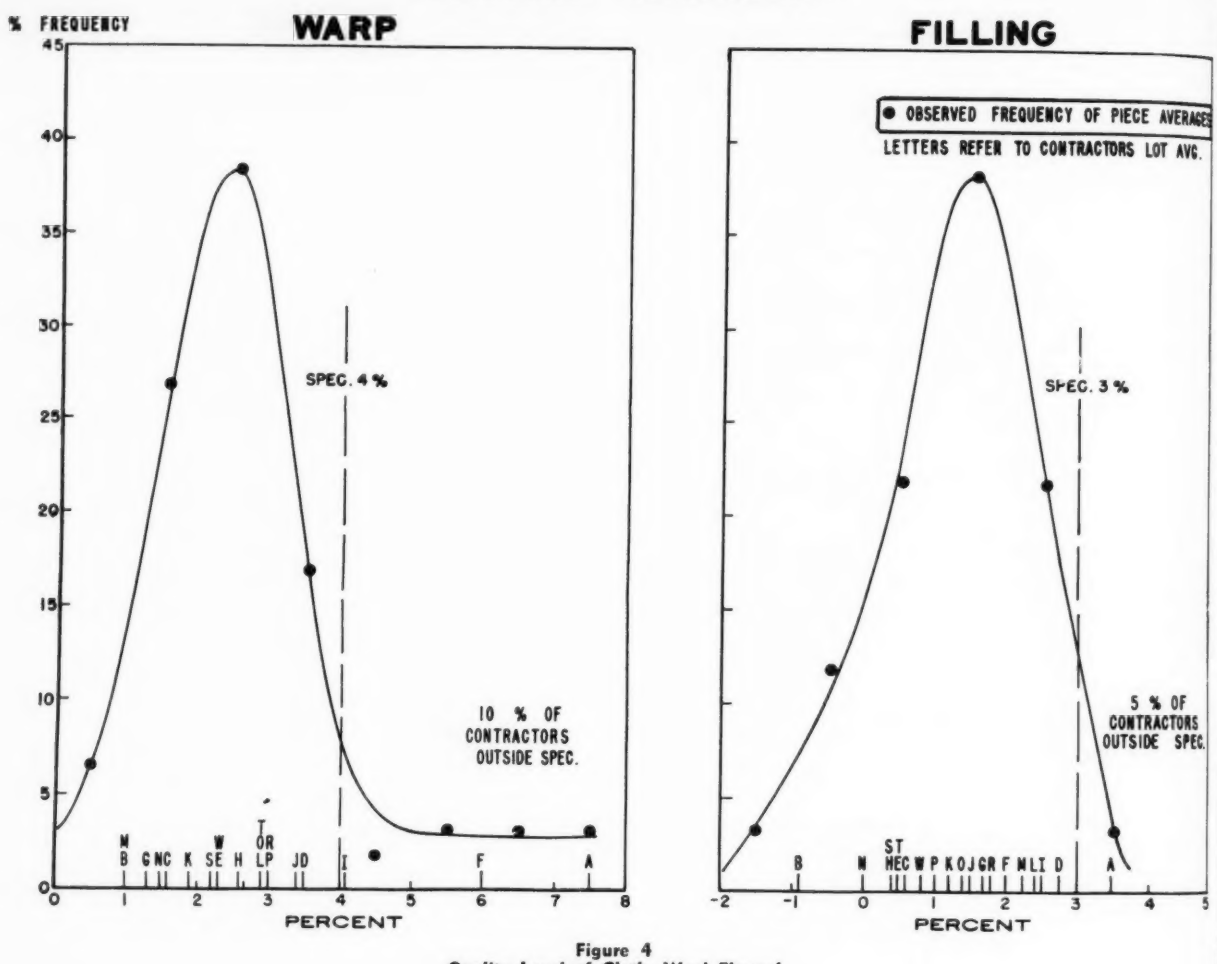

Figure 4
Quality Level of Cloth, Wool Flannel
(10.5-oz Shrink Resistant)

ing operations prior to cutting. The average relaxation shrinkage of 3.1% for the warp and 1.2% for the filling fall well within the specification requirements of 5.0% and 4.0% respectively.

There did not appear to be any association between the amount of relaxation and felting shrinkage. One contractor failed to meet both the warp and filling requirements for felting shrinkage and two contractors failed to meet the warp requirements alone. One of these two contractors exceeded the 4.0% warp felting by such a small amount that his fabric could be considered acceptable. The other, however, along with the contractor whose fabric shrank excessively in both directions, far exceeded the allowable warp felting shrinkage. Both used the same shrink resistant treatment. The averages of 2.9% for the warp and 1.3% for the filling compare favorably with the specification requirement of 4.0% and 3.0% respectively.

TABLE II

PERCENTAGES OF ACCEPTABLE AND UNACCEPTABLE FABRIC SUBMITTED BY EACH CONTRACTOR ON BASIS OF LIBERAL SHADE TOLERANCES

	O D 33			*Blue 84*	
Contractor	*% Acceptable*	*% Unacceptable*	*Contractor*	*% Acceptable*	*% Unacceptable*
C	25	75	B	0	100
D	0	100			
F	43	57	E	57	43
G	100	0			
I	61	39	H	100	0
K	100	0			
L	100	0	J	59	41
M	49	51			
P	0	100	N	65	35
R	96	4			
S	88	12	O	100	0
W	64	36			
			T	0	100
Average	60.5	39.5	Average	54.4	45.6

STIFFNESS AND AGING——The stiffness of the fabrics originally and after light- and heat-aging is plotted in Figure 5. The specification requirement for an original stiffness of not more than 0.0030 lb was easily met by all of the contractors. With further improvement of the resin processes it is likely that this value can be reduced even further. Results of the aging tests revealed that the heat-aging test is more discriminating than the light-aging test. Three of the fabrics were treated with aging type resins, and all three were identified by the heat-aging test, whereas only

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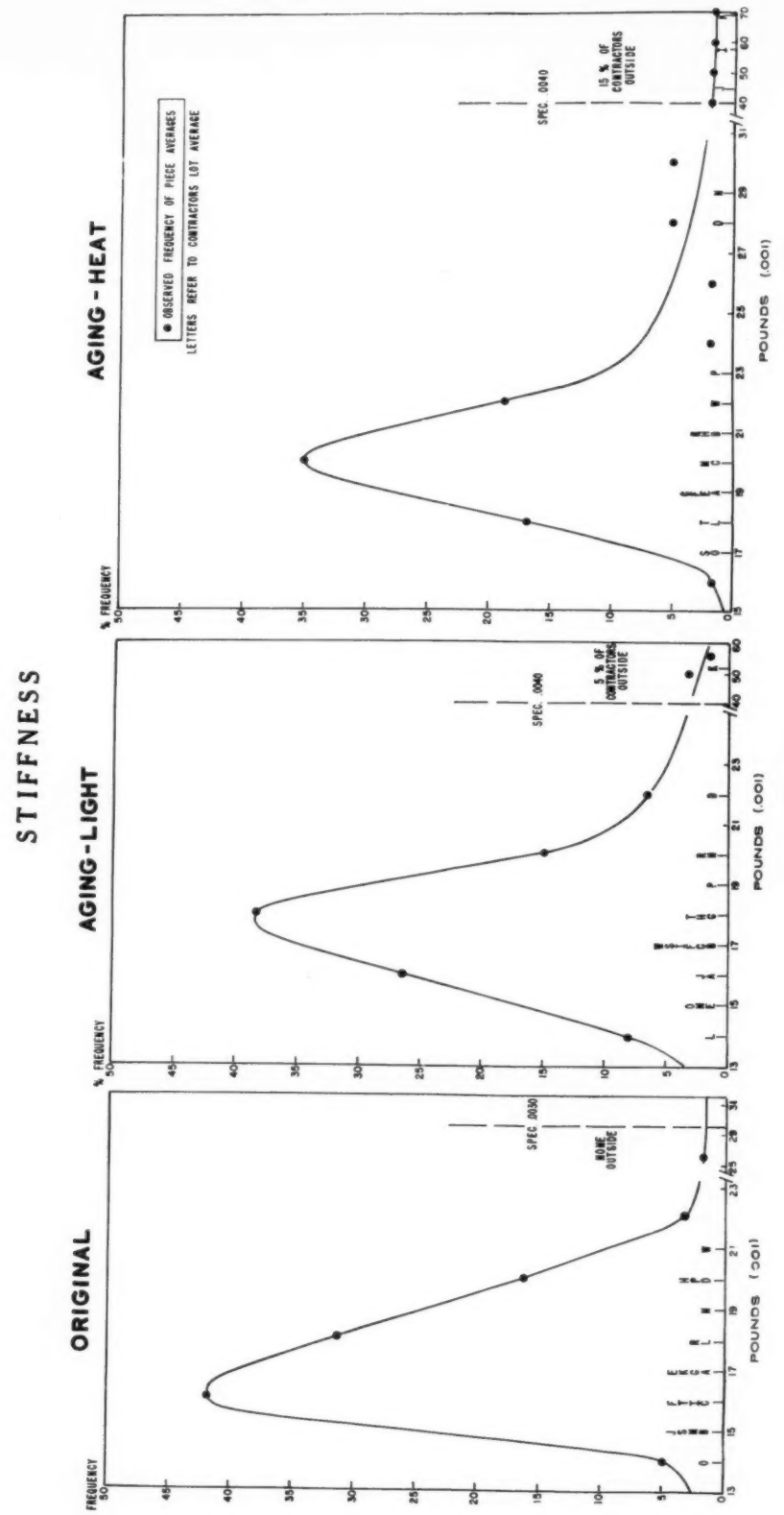

Figure 5
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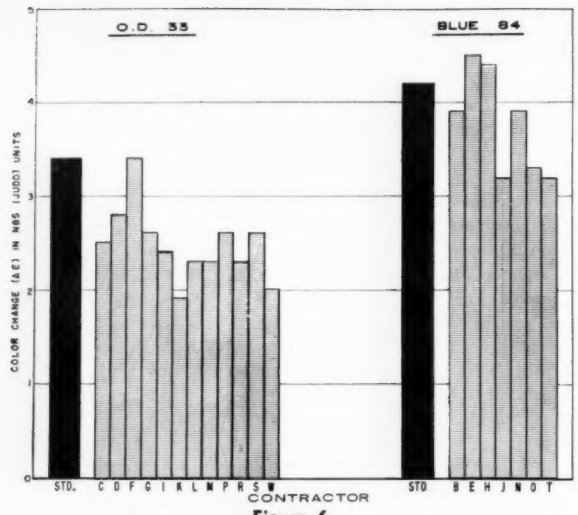

Figure 6
Change in Color of Shrink Resistant Treated Shirting After 5 Mobile Launderings

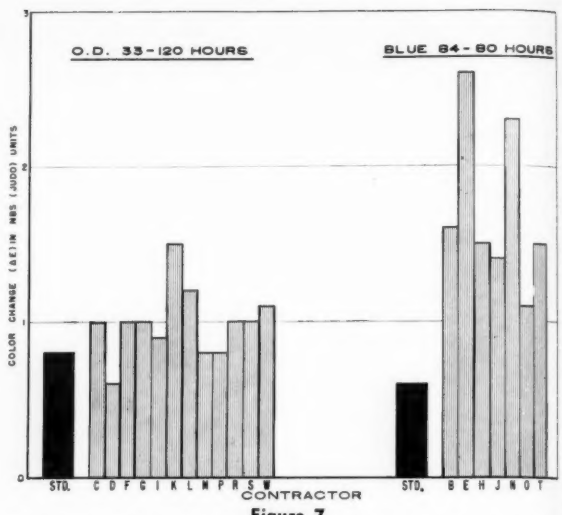

Figure 7
Change in Color of Shrink Resistant Treated Shirting After Fade-Ometer Fading

one was identified by the light-aging test. The specification level of 0.0040 lb for stiffness after aging appears to be satisfactory, although one piece from one of the contractors who used the aging type resin did meet this requirement after heat aging.

COLOR——The variations in shade for both the OD 33 and Blue 84 were quite broad. Inasmuch as the quantities of fabric dyed were relatively small, it was realized that more difficulty would be encountered in the control of shade than in regular full production runs. For this reason, much more liberal tolerances than customary were allowed in the evaluation of the fabrics for shade. The tolerances were placed approximately 1.25 Judd units from the standard. Table II shows the percentages of pieces of cloth from each contractor that would be considered acceptable and unacceptable according to these liberal shade requirements. The variation in shade noted among the deliveries of the various contractors, as well as within a given contract, is indicative of the necessity for careful control of the dyeing and finishing process. It was not possible to relate variations specifically to any one class or type of treatment. For each shade there were instances of 100 per cent acceptable deliveries and 100 per cent unacceptable deliveries, indicating that a resolute effort may have been made in some cases and possibly not in others.

An indication of the spread in shade noted among the fabrics can be obtained from Table III which shows the trichromatic coefficients and color differences calculated by the Nickerson formula (6) for samples representing the extreme limits of shade delivered. Since the contractors had to use a specified dyestuff formula for the OD 33, it was assumed that these fabrics would fall within a closer visual tolerance than those dyed to the Blue 84 where any dyestuff of the approved class could be employed. This was found to be the case although it is not apparent in the numerical data because of the differences in sensitivity of the human eye in different spectral regions, smaller color differences being observable in the OD range than in the blue. Consideration of the data must also be tempered by the fact that some refinishing is known to have been practiced by individual contractors for one reason or another.

TABLE III
COLOR CHARACTERISTICS OF INDIVIDUAL SPONGED SAMPLES SHOWING WIDEST DEVIATIONS FROM STANDARDS

Sample No.	*x*	*y*	*Y*	*Dominant Wave Length*	*% Excitation Purity*	*Δ E Judd Units*
			OD 33			
Standard	0.3577	0.3559	0.545	580.0	23.0	
1	0.3587	0.3552	0.548			0.84
2	0.3504	0.3525	0.612			1.76
3	0.3517	0.3533	0.591			1.39
4	0.3531	0.3568	0.531			1.01
5	0.3525	0.3560	0.643			2.69
6	0.3548	0.3578	0.537			0.59
7	0.3511	0.3511	0.522			1.39
8	0.3561	0.3543	0.542			0.59
9	0.3544	0.3538	0.535			0.59
10	0.3570	0.3520	0.513			1.26
11	0.3520	0.3514	0.531			0.92
12	0.3551	0.3545	0.544			0.59
13	0.3487	0.3482	0.627			2.44
14	0.3535	0.3506	0.554			0.92
			Blue 84			
Standard	0.2601	0.2556	0.419	473.6	25.5	
1	0.2573	0.2540	0.421			1.26
2	0.2638	0.2610	0.426			0.42
3	0.2581	0.2538	0.440			0.59
4	0.2603	0.2550	0.506			2.44
5	0.2639	0.2569	0.450			0.84
6	0.2577	0.2552	0.458			0.92
7	0.2585	0.2549	0.520			2.56
8	0.2610	0.2574	0.461			1.18
9	0.2552	0.2538	0.440			1.26
10	0.2578	0.2516	0.408			0.71

COLORFASTNESS——The color change in Judd (NBS) units after five mobile launderings is plotted in Figure 6. Each value shown is an average of five replicates with a mean deviation of ± 0.2 Judd unit. In spite of this wide variance of the value about the mean it can be concluded that the laundering fastness of the shrink resistant treated samples is as good as or better than that of the untreated, with the OD 33 samples showing a more significant difference than the Blue 84 samples.

In Figure 7 is shown the resistance of the samples to Fade-Ometer fading. The mean deviation of these values is of the same order as that for the data shown in Figure 6. Hence the differences in fastness to fading between the shrink resistant treated and untreated OD 33 samples cannot be considered significant. Significant

variation was obtained with the Blue 84 samples, but this may be due to the use of different dyestuffs, since the dyestuff formulation was not specified here as it was in the case of the OD 33. Inasmuch as the shrink resistant treatments used for the OD 33 and for the Blue 84 were the same, and the Blue 84 samples showed much more variation in light fastness than the OD 33 samples, it is assumed that the dyestuffs rather than the shrink resistant treatments were primarily responsible for the differences noted.

Table IV shows the data obtained for fastness to wet cleaning, perspiration (acid and alkaline), and wet and dry crocking. The relative ranking of the samples for resistance to wet cleaning and perspiration is based on a system propounded by AATCC and used throughout the industry in which 5 denotes a negligible color change or none at all, and 4, 3, 2, and 1 are equivalent to Munsell values of 9, 8, 7, and 6 respectively. To meet vigorous military fastness requirements the relative ranking should be 4 or 5. Crocking values are shown as Munsell numbers in accordance with prevailing practice in military specifications. In general the shrink resistant treated samples appear to be as satisfactory as the untreated standards in their resistance to wet cleaning, perspiration, and crocking. In the few instances where the treated samples were poorer than the untreated, a lack of control and (in the case of the Blue 84) the differences in the dyestuffs used are probably responsible rather than the shrink resistant processes.

VI CONCLUSIONS

1) Approximately 84% of the contractors met the requirements for warp breaking strength and 90% met those for filling breaking strength. Low breaking strength was associated with low cloth weight.

2) Only 50% of the contractors met the weight requirement of the specification, all the rest being below the specification minimum. The most consistent cause for low weight was the failure to recognize that the shrink resistant treated wool would not full and increase in weight during the scouring operation.

3) Ninety per cent of the contractors met the requirements for relaxation shrinkage, both in the warp and filling direction. There appears to be no relationship between relaxation shrinkage and the shrink resistant treatment as such.

4) Ninety per cent of the contractors met the specification requirements for felting shrinkage both in the warp and filling direction. Two of the contractors who failed to meet the felting shrinkage requirements used the same treatment.

5) All the contractors met the specification requirements for original fabric stiffness.

6) Ninety per cent of the contractors met the requirement for stiffness after light aging and 85% met that for stiffness after heat aging. All of the contractors who failed to meet aging requirements used shrink resistant resin treatments which are known to have poor aging characteristics.

7) Approximately 61% of the OD 33 pieces produced by all contractors were considered acceptable from a liberal shade standpoint, while only 54% of the blue samples were considered acceptable. Three contractors who produced OD 33 and two who produced Blue 84 had 100% of their production within these liberal shade tolerances.

8) Both the blue and the OD shrink resistant treated shirting seemed to show slightly better fastness to washing than the respective untreated standards.

9) The OD 33 shrink resistant treated shirtings were not significantly different in resistance to Fadeometer fading from the untreated, but the Blue 84 showed in general somewhat poorer resistance than the untreated standard. These differences in the Blue 84 are probably due to the dyestuff used. Differences in other fastness properties, wet-cleaning, perspiration and crocking could not be significantly related to the shrink resistant treatment.

10) Based on the experiences of this study, the production of shrink resistant shirting appears practical and feasible for military procurements. Production experience subsequent to the completion of these Educational Orders confirms the practicality of shrink resistant treated wool for military use.

ACKNOWLEDGMENTS

The cooperation of the various mills and process sponsors listed in Appendix A in the production and treating of the fabrics is gratefully acknowledged. The test data were obtained and analyzed in the Quartermaster Research and Development Laboratories with the assistance of Gertrude L Buri, Helen Buczek, Frank J Spagna and John H Fossum. Special acknowledgment should be made to J Fred Oesterling, Erwin D Kruegel, and S J Kennedy for their valuable suggestions and support. The report was edited by Norman E Roberts, Publications Editor, and data prepared in graphical form by Gerald Winston and John Medernach, Statistical Branch, Quartermaster Research and Development Laboratories.

APPENDIX A

List of Contractors on Educational Orders

American Woolen Company, 225 Fourth Avenue, New York, NY
Ames Textile Corp, Empire State Building, New York 1, NY
Bachmann Uxbridge Worsted Corp, Uxbridge Worsted Co Div, Uxbridge, Mass
Guerin Mills, Inc, 292 East School Street, Woonsocket, RI
The Livingston Worsted Mills, Inc, Holyoke, Mass
Lorraine Manufacturing Co, Pawtucket, RI
Merion Worsted Mills, West Conshohocken, Pa
Metcalf Brothers and Co, 45 East 17th Street, New York 3, NY
Methuen International Mills, Methuen, Mass
Pacific Mills, 261 Fifth Avenue, New York 16, NY
Shamokin Woolen Mills, Inc, 450 Seventh Ave, New York, NY
Sheppard Mills, Inc, Manayunk Station, Phila 27, Pa
Stillwater Worsted Mills, Inc, Harrisville, RI
John Walther Fabrics, Inc, Ontario and

TABLE IV
RESISTANCE OF SHRINK RESISTANT FABRICS TO WET CLEANING, PERSPIRATION, AND CROCKING

Contractor	AATCC Ranking			Munsell Value	
	Resistance to Wet Cleaning	*Resistance to Perspiration*		*Crocking*	
		Acid	*Alkaline*	*Wet*	*Dry*
		OD 33			
Standard	5	4	4	8	9
C	5	4	4	8	9
D	4	4	3	8	8
F	5	2	3	9	9
G	5	4	4	8	8
I	3	3	3	8	8
K	3	4	3	8	9
L	5	4	4	7	9
M	5	4	5	8	9
P	4	3	2	9	9
R	5	4	4	9	8
S	4	3	3	9	9
W	5	3	4	9	9
		Blue 84			
Standard	5	5	5	9.5	9.5
B	4	4	1	8	8
E	5	3	1	9	9
H	4	4	3	9	9
J	4	4	4	9	8
N	4	4	4	9	9
O	4	4	4	8	9
T	4	4	4	8	8

"D" Streets, Phila 34, Pa

Windsor Manufacturing Co, Jasper and Butler Streets, Phila 24, Pa

William Whitman Co, Inc, 261 Fifth Avenue, New York 16, NY

Yorkshire Worsted Mills, Lenni, Pa

Trade-Names

Lanaset—American Cyanamid Co, Calco Chemical Div, Bound Brook, NJ

Sanforlan—Cluett Peabody and Co, Inc, 10 E 40th St, New York, NY

Kroy—Kroy Inc, 80 Market St, Lowell, Mass

Koloc—Naugatuck Chemical Co, Div of US Rubber Co, Naugatuck, Conn

Harriset—Harris Research Laboratories, 1246 Taylor St, Washington, DC

Schollerize—Scholler Bros Inc, Collins and Westmoreland Sts, Phila, Pa

Resloom—Monsanto Chemical Co, Merrimac Division, Everett Station, Boston, Mass

Kelpie—S and M Dye Works, Inc, 3419 Richmond St, Phila, Pa

Durlana—Warwick Chemical Co, West Warwick, RI

APPENDIX B

AGING TESTS

LIGHT AGING——A specimen of the finished cloth approximately 2.5 inches wide and 6.5 inches long shall be exposed in a fading machine for a period of 100 hours with face of the fabric exposed to the source of radiaiton. At the end of this time, the specimen shall be removed, conditioned in a standard atmosphere for a period of 4 hours and evaluated for harshness and for stiffness.

HEAT AGING——Four treated specimens, 3 inches square, shall be used for this test. The apparatus shall consist of a well ventilated oven controlled at 200° ± 5°C. Two glass plates 6 inches square, approximately ⅜ inches thick and each weighing approximately 1.25 pounds shall be used. The four specimens of the treated fabric are placed one on top of the other between the two six-inch square glass plates and placed in the oven at 200°C for a period of one hour. Upon completion of the heating period, the test specimens shall be removed from the oven, conditioned for four hours in a standard atmosphere, and evaluated for harshness and for stiffness.

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(3) Harris, M and Smith, A L, "Oxidation of Wool: Alkali-Solubility Test for Determining the Extent of Oxidation", *J Research Nat Bur Standards* 17, 577 (1936).

(4) *Description and Instructions for the Hunter Color and Color Difference Meter*. Bethesda, Md: Henry A Gardener Laboratory, Inc, June 1950.

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ABSTRACTS

An Evaluation of Carriers for Use in the Application of Acid Dyestuffs to Dynel

J H Cox.

(Thesis presented to Georgia Institute of Technology in partial fulfilment of the requirements for the degree Master of Science in Textiles).

Summary

To solve the dyeing affinity problem of certain synthetic fibers, such as Orlon, Dacron, and dynel, one approach has been to incorporate assistants in the dyebath to swell the fiber and/or to transport the dye from the aqueous phase to the solid fiber phase. The object of this study was to determine quantitatively the effect on dynel of certain carriers or swelling agents in 1) dyebath exhaustion, 2) skein shrinkage, 3) breaking strength, and 4) light-fastness of dyestuff.

To determine the effectiveness of various carriers and/or swelling agents, skeins of dynel were dyed in baths containing a fixed amount of dye, water, and wetting agent. The amount of carrier placed in each bath varied from 1 to 10 per cent based on weight of skeins. At the completion of dyeing, the percentage exhaustion of the dyebath was determined by use of a Duboscq colorimeter for each amount of carrier used. The dyed skeins were then washed, dried, and measured for shrinkage. Serigraph breaking strength tests were made to determine the effect of carrier on the yarn strength. Samples of the dyed yarn using 4 per cent carrier were exposed in an Atlas Fade-Ometer for a period of 40 hours to test the effect of the carrier on the light-fastness properties of the dye.

It was found that beta-naphthol, p-phenylphenol, beta-naphthylamine, and p-chlorophenol were the most effective compounds in exhausting the dyebath. However, when the amount of these carriers exceeded 3 per cent, there was, with the exception of p-chlorophenol, much shrinkage and loss of breaking strength of the yarn. Furthermore, beta-naphthylamine caused fading of the dyestuff to occur after less than 10 hours of exposure in the Fade-Ometer.

Resorcinol, hydroquinone, Naphthol AS, and p-phenylenediamine were found to be of doubtful value as carriers.

It was also found that sulfuric, formic, salicylic, and benzoic acids were highly effective as dyebath exhausting agents when used in percentages of less than 4 per cent. When more than 4 per cent was used the dyebath exhausting efficiency of sulfuric, benzoic, and salicylic acids was reduced.

The acids had no deleterious effects on the yarn shrinkage, breaking strength, or fastness to light of the dyestuff—WHC

Soda-boil Stripping

Anon, *Dyer* 108, 761-2, November 28, 1952.

The soda-boil is a useful standby, when it is necessary partly to strip acid-, commercial union-, and direct cotton dyes from the more robust kinds of stock, such as worsted coatings, serges, astrakhan with a cross-bred worsted pile, union cloths and hard-twisted worsted and mohair yarn. The soda-boil process has some advantages in such cases over stripping treatments requiring the use of hydrosulfite compounds. Among them is the ease with which a level and stable ground shade is obtained, there being little if any risk of partial development of certain dyes that are but temporarily decolorized as the result of employing a hydrosulfite compound.

When it is necessary to remove part of the color from a compound shade composed of an assortment of leveling acid dyes, it is frequently found that the soda-boil stripping process provides a means of reducing intensity without bringing about the extreme alteration in tone often noticeable when a batch has been treated with hydrosulfite.

In preparing the soda-boil stripping bath the author recommends entering the goods into the cold liquor and then bring-

ing to the boil. The amount of soda ash to be used depends on the amount of residual acid left in the goods. It is by no means essential that the stripping bath be strongly alkaline; a good many leveling acid dyes leave the animal fiber sufficiently in a mildly alkaline liquor, possessing a value, for example, of pH 7.5.

After stripping is complete, the author recommends cooling down the bath very slowly, to avoid creases, crows' feet and similar distortions in the goods.

Before adding any more acid dyes to the bath to bring the goods to shade, it is usual to exhaust the remainder of the dye still in the liquor by boiling and the cautious addition of sulfuric or formic acid. The amount of acid to be added should be governed by a pH test of the remaining dye liquor.—WHC

Causes and Control of Dermatitis

Anon, *Canadian Textile J* 69, 62-3, December 5, 1952. (From *Industrial Health Bull*, Ottawa, Ont.)

The human skin is equipped with a variety of protective devices; the tough outer layer will withstand the action of moderately strong acids, but it is not proof against alkalis and fat solvents; perspiration serves to dilute those irritating substances which dissolve in water and thus reduce their harmful action on the skin; the oils and fats form a protective coating for the skin, but are dissolved by certain solvents; the skin pigment or coloring serves to protect the skin against harmful rays of light.

However, excessive sweating may soften the skin and make it easier for irritating substances to penetrate it; sweat may also dissolve some irritating substances which may then penetrate the skin.

A clean, well-ventilated environment is essential to reduce the chances of dermatitis, but personal cleanliness is of equal importance. If the worker does not keep himself clean, irritant materials may be in prolonged contact with the skin and may cause dermatitis.

Some people are susceptible to certain substances and any contact causes dermatitis and other unpleasant reactions. This type of sensitivity may be inborn, or it may develop after one or more previous contacts with the sensitizing agent, and result in allergic reactions on subsequent contact.

Repeated rubbing and friction of the skin may cause dermatitis even though there is no other infection present; irritation by sand, coal dust, particles of metal and other materials may all cause dermatitis, and cuts and abrasions may become secondary sites of disease present on other parts of the body.

Heat, cold, radiation from radioactive materials, electricity, and x-rays are the chief physical agents which may cause dermatitis. Chemical agents may be responsible for primary irritation by direct action on the skin, or they may act as sensitizing agents.

Bacteria, fungi, and parasites are capable of producing dermatitis on the intact skin, and they may produce a secondary infection in cuts, scratches or punctures.

The report emphasizes the importance of acquainting employees with any occupational hazards which may lead to dermatitis, and of treating promptly any cases that may arise; also the necessity of careful washing after work, to remove any irritating material from the skin. If necessary, protective clothing should be furnished. —WHC

Preserving Wool's Softness in Shrink-resisting Processes

"Textile Chemist," *Textile Recorder* 70, 77-3, November, 1952.

A valuable property of wool, and particularly of the higher qualities of wool, is a pleasing softness of handle, and it is therefore important, in the various processes to which wool goods are subjected, that suitable precautions be taken to ensure that this property is not adversely effected. Particularly is this necessary in finishing processes designed to reduce the felting power and the tendency of wool to shrink in washing treatments.

Shrinkproofing processes presently available fall into two main groups. In the first, the wool is treated with selected reagents (active chlorine, oxidants, reducing agents and other chemicals) and under such conditions that definite chemical modification of the wool takes place. These processes, when used drastically, lead to the loss of weight of the wool material. In the second group, substances are applied which are not primarily designed to attack the wool chemically, but which serve the purpose of modifying its properties by a simple deposition within or upon the wool fibers. Resins are chiefly used in processes of this type, and they invariably lead to an increase in the weight of the wool material.

Those processes which are based on a chemical treatment of the wool can be better adjusted to leave the wool soft than can those processes which add something to the wool. Unfortunately, however, any chemical attack of wool leads to at least some degree of degradation and a depreciation of the wool properties; while it is general experience that in applying resins to wool, a definite loss of softness of handle inevitably follows.

Examination of the unshrinkable wool material as produced by a number of the chemical processes now in use suggests that the resistance to shrinkage is at least due in part to a formation of a film of regenerated wool or keratin on the outside of each fiber, which has the effect of masking the rough epithelial scales and so reducing their felting power. The firmer handle of the treated wool can be associated with this film of regenerated keratin.

It has been found that the sulfuryl chloride treatment for shrinkproofing certainly gives a softer wool than do those processes which depend on the use of caustic alkalis dissolved in organic solvents, such as ethyl alcohol or a white spirit and butyl alcohol mixture. A newer process which utilizes an aqueous liquor containing potassium permanganate and hypochlorite (either of these reagents may be considered as an activator of the wool, causing it to react better with the other) gives wool that is superlatively soft, according to the writer. On the whole, it has been found that processes which involve the use of acid conditions favor softness better than do those which make use of alkali, and even acidified hypochlorite solutions can be adjusted to leave the wool soft.—WHC

New Unshrinkable Finishes: Superior Processes for Wool Using Synthetic Resins

A J Hall, *Textile Mercury & Argus* 127, 927-9, 984-5, November 21 and 28, 1952.

The author, in discussing the problem of shrinkproofing wool goods while retaining the softness of the fabric, calls attention to four new processes, all involving the use of synthetic resins, which claim to be improvements over the presently employed methods in this respect.

B P 679,386 recommends treating the wool with a solution of methylated trimethylol melamine (other types of resin may also be used) in water acidified with acetic acid, and drying at 225° F for 6 minutes, followed by treatment with a suitable softening agent (see B P 655,541). This process is said to be equally applicable to mixtures of wool with other fibers.

B P 669,991 utilizes a solution of chlorinated melamine-formaldehyde, which is applied to the wool material by padding, together with an acid catalyst, followed by heating above 212° F. Another similar process employs chlorine and methylated melamine-formaldehyde. Here use in made of the antifelting property of chlorine in addition to the resin. The use of Chloramine T, etc, as well as bromine compounds, is also mentioned in this connection.

In B P 658,994 it is claimed that improved results are obtained in urea or melamine-formaldehyde resin treatment if there is present in the shrinkproofing liquor an excess of free formaldehyde. This process involves curing at 250-300°F.

All of these processes are described by

the author at considerable length, and emphasis is laid on the softness of the treated material.—WHC

The Working and Dyeing of Coir Yarn

H Faldik, *Textile J Australia* 27, 780-2, 794, September, 1952. (Translated from *Textil-Praxis*)

Coir is a vegetable fiber which is imported principally from Ceylon. Coir yarn is spun only in the countries of its origin, frequently by hand.

The fiber belongs to the cellulose group, but contains impurities, such as lignin or pectin substances. It has the ability to dye with either acid or basic dyes, as well as direct dyes. It is usually dyed in the unbleached state.

Basic dyes are applied in a boiling bath. Acetic acid is used to dissolve the dye. Acid dyes require the addition of either alum or formic acid; the latter method is said to give better penetration and fastness to rubbing. Direct dyes are applied with anhydrous sodium sulfate.

The author gives lists of selected dyes of all three classes which are suitable for this work.

A special method for dyeing coir with acid dyes calls for an addition to the dyebath of sodium bisulfite. This process has two advantages: the bisulfite has a bleaching action which lightens the shade of the fiber (normally yellowish brown), and the yarn is said to dye more evenly than without the bisulfite.

Good penetration of the fiber will only be achieved by the addition of a wetting agent of high efficiency.

The color of coir can be lightened when necessary by a treatment with sodium hydrosulfite. It can be bleached to a light yellowish color by calcium hypochlorite. The author states that a good white can be obtained without much damage to the fiber by treating the yarn two or three times with peroxide, followed by hydrosulfite.

Coir fiber yarn is used principally for the manufacture of carpets and mats. It has a high resistance to abrasion.—WHC

Silicones: Dyehouse Developments

Anon, *Textile J Australia* 27, 800-2, September 1952. (From *Hosiery Trade J*)

The parent substance of all silicones is silicon, one of the most abundant elements, constituting about 25 per cent of the earth's crust. Silicon compounds have been used in an empirical manner for a long time in the manufacture of bricks, cement, glass, and ceramics. It is only recently, however, that an extensive study of the chemical behavior of silicon has been made, thereby opening up a new field for the industrial chemist.

Paints and varnishes based on silicones have been made which have outstanding resistance to heat. They are also interesting because of their ability to withstand chemical corrosion, a property highly valued in dyehouses. They are particularly immune to the action of acids and oxidizing agents, but unfortunately they do not stand up very well to alkalis.

Silicone oils and greases are unique because they are extremely stable and are not acted upon by the oxygen of the air, and particularly because of their small changes in viscosity with wide variations in temperature.

In the textile field the silicones are finding application in the manufacture of waterproof fabrics. Cotton responds very well, but the treatment is said to be not so effective on wool and silk. A very light but strong and completely waterproof nylon fabric has been made by this method.

A rubber-like substance has been synthesized from silicones which retains its elasticity at high temperatures and will not melt even at 300° C. It has been found useful for insulating flexible connections which are exposed to relatively high temperatures, and as a covering for squeeze rolls which are similarly heated.—WHC

Analysis of Resin Deposit in Wrinkle-proof Finishing

W Graeser, *Textile J Australia* 27, 828-9, September, 1952. (Translated from *Textil-Praxis*)

Wrinkle-proof properties are not always uniformly distributed over a woven material; i e, it may be creaseproofed to varying degrees across the piece. Such variation may be due to migration of the resin solution during drying, or to variations in the curing conditions due to inadequate circulation.

The author describes a simple staining method which in a short time permits accurate determination of the uniformity of the resin deposit.

A strip of the creaseproofed material taken across the entire width is dyed with 0.5 per cent Kiton Pure Blue V in an acid bath for 20 minutes at 80° C, together with a sample of the same material which has not been resin-treated. The two specimens are then rinsed in cold water until the unfinished sample becomes colorless. The amount of Blue on the finished cloth will serve as a measure of the resin deposit.

The pH of the dyebath should be 2.4 to 2.6 for all resins containing NH_2 groups, but under pH 1 for melamine resins.

A high content of resin on the fabric is indicated by a dark coloring, and a lower content by a weaker coloring. In addition, a well-cured resin (hardened at a sufficiently high temperature and for a sufficient time) will dye deeper than an insufficiently cured resin.

A disadvantage of the test is that it can be made only on white material. (It is suggested by the abstractor that if the cloth to be creaseproofed is already dyed, a yard or two of the same fabric but uncolored might be sewed in before creaseproofing, and the test made on the uncolored sample)—WHC

Dyeing and Finishing Acetate Blends

F Fortess and G C Ward, *Dyer* 108, 565-71, October 17, 1952.
(From a paper presented at the Third Canadian Textile Seminar at Kingston, Ontario).

Blends of acetate and wool are dyed with a combination of acetate and acid dyes, by either a single-bath or a two-bath method. Lists of suitable dyes and dyeing assistants and detailed instructions for the dyeing operation are given.

Blends of acetate and rayon, fast to light and washing, are dyed with combinations of acetate and direct dyes, after-treated with Cuprofix. Suitable dyes are listed. It is possible to dye solid shades or contrasting colors on the two fibers.

In finishing blends of acetate and rayon it is possible, by the use of urea-formaldehyde and other crease-resisting substances, to improve the hand, bulk, recovery from wrinkling, and dimensional stability; but the authors point out that this treatment is required for the rayon portion only, and every effort should be made to permit the resin to go on the rayon rather than on the acetate. The importance of careful drying and curing and thorough washing is stressed.

Inadequate finishing may lead to sewing difficulties. In order to avoid cutting of the threads by high-speed sewing machines, the fabrics should be well softened to provide adequate lubricity.

The application of silicones to these textiles is described, with much detail of the chemistry of the silicon compounds. The primary purpose of the silicone treatments is to produce water repellency, but in addition there is an improvement in wrinkle recovery, an increase in flex abrasion resistance, and an improvement in Hoffman press shrinkage. In general the treated fabrics feel softer and smoother and are more resilient.

The authors believe that the silicones, if properly exploited, may impart many useful properties to acetate fabrics.—WHC

Proceedings of the
American Association of Textile Chemists and Colorists

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Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

March 2, 1953

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

53-1

Education: Chemistry and Dyeing, Rhode Island School of Design

Experience: Overseer of dyeing; cotton, rayon and blends

Age: 45; married; references; northeastern U S preferred

2-16, 3-2

53-3

Education: BA, chemistry, with additional course in textile testing

Experience: Chemist for a bleachery and dyeworks now liquidated

Age: 62; single woman; references; Eastern Massachusetts preferred

2-16, 3-2

53-4

Education: BS, chemistry with additional business training

Experience: textile chemist

Age: 37; married; references; administrative or supervisory position desired

3-2, 3-16

53-5

Education: BS, Chemistry & Dyeing; honor student

Experience: textile chemist and dyer

Age: 27; married veteran; references; New England preferred

3-2, 3-16

CALENDAR

AATCC

COUNCIL
April 17, June 5.

GENERAL RESEARCH COMMITTEE
March 12.

NATIONAL CONVENTIONS
September 17-19, 1953 (Hotel Conrad Hilton, Chicago); 1954 (Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J).

HUDSON-MOHAWK SECTION
March 20, May 8 (Albany); June 19 (Outing).

MID-WEST SECTION
April 18 (Netherland Plaza, Cincinnati, O); June 13 (Outing, Lake Delavan, Wis); November 7 (Hotel Bismarck).

NEW YORK SECTION
April 17, May 22 (Kohler's Swiss Chalet, Rochelle Park, N J); June 19 (Outing, North Jersey CC, Wayne, N J).

NORTHERN NEW ENGLAND SECTION
Mar 6 (MIT Faculty House, Cambridge); April 17 (Lowell Textile Inst, Lowell); May 15 (Andover CC, Andover); June 12 (Annual Outing); Nov 6 (LTI); Dec. 4 (MIT Faculty House).

PHILADELPHIA SECTION
Mar 6 (Kugler's Restaurant, Phila); April 24; May 22 (Outing, Manufacturer's Golf & Country Club); Sept 11; Oct 23; Dec 4; Jan 15, 1954.

PACIFIC SOUTHWEST SECTION
April 24 (Nikabob Cafe, Los Angeles).

PIEDMONT SECTION
April 11, (Robert E Lee Hotel, Winston-Salem, N C); June 12-13 (Mayview Manor, Blowing Rock, N C); Sept 12 (Hotel Charlotte, Charlotte, N C).

RHODE ISLAND SECTION
Mar 27 (Providence Eng Soc); Apr 24 (Wannamoisett C C); May 22 (Prov Eng Soc); June 12 (Outing, Wannamoisett C C); Oct 23 (Prov Eng Soc); Dec 4 (Annual Meeting, Sheraton - Biltmore, Providence).

SOUTH CENTRAL SECTION
May 23 (Patten Hotel, Chattanooga, Tenn); Aug 21-22 (Outing, Chattanooga Golf & Country Club, Chattanooga, Tenn); Dec 5 (Patten Hotel).

WESTERN NEW ENGLAND SECTION
Mar 20 (Rapp's Restaurant, Shelton, Conn); May 8 (Ladies Night); June 19 (Outing); Oct 2, Nov 6 and Dec 11 (Rapp's).

• 22nd Annual Meeting, ISCC

THE Inter-Society Color Council's 22nd Annual Meeting will be held Wednesday, March 18th at the Hotel Statler, New York, N Y, preceding by a day the Optical Society Meeting (also at the Statler).

The morning session will be occupied with reports from the various subcommittees of the Problems Committee. Following luncheon, reports of the officers will be given and several items of business discussed. The Technical Committees on color problems will give their reports and there will also be reports from the twenty member Bodies (including AATCC) summarizing 1952 color activities. The balance of the afternoon will be devoted to a continuation of the discussion on the Problems Committee reports heard in the morning.

— ♦ ♦ —

Western New England Section Meeting Report

January 30, 1953
Rapp's Restaurant, Shelton, Conn

A MEETING of the Western New England Section was held on January 30, 1953 at Rapp's Restaurant, Shelton, Connecticut. The technical program consisted of a talk on high-temperature dyeing methods for synthetic threads by Walter E Thompson, Jr, Director of Research and Sales Promotion for Heminway and Bartlett Company.

Samples were shown to illustrate how pressure dyeing methods are of particular benefit for nylon and polyacrylonitrile threads. Among the advantages discussed were reductions in dyeing time, smaller amounts of dyestuff required and better leveling of colors.

Seventy-five members and guests were present.

Respectfully submitted,
N J GLADE, *Secretary*

THE Quartermaster Air Force Dye Survey Committee consisting of over 30 AATCC technicians and members of the Quartermaster Corps and USAF have started a study of formulas in use for dyeing standard military shades on wool and expects within one year to determine the best color formulations to produce the fastest shades with eventual adoption of these formulas as required practice on military orders. Evaluation of the results will be carried out at AATCC's Lowell Research Laboratories and at the Philadelphia Quartermaster Lab.

ONE HUNDRED AND SEVENTY-FOURTH GENERAL RESEARCH COMMITTEE MEETING

THE 174th meeting of the General Research Committee was held at the Hotel Commodore, New York, N Y, on Friday, January 16, 1953.

Charles Dorn, Chairman, opened the meeting at 1:40 pm, after which he introduced L S Little, Chairman of the Executive Committee on Research, who spoke on the plans of that committee to stimulate and guide the work of the research associates at Lowell. He also placed some emphasis upon the technical releases resulting from the work of the committees. All such releases will be considered for circulation to the Corporate Membership.

Mr Dorn announced that the Executive Committee on Research has agreed to reactivate the Committee on Fastness of Color to Perspiration and the Committee on Fastness of Color to Chlorine. A new committee is being formed on absorption, and the formation of a committee to cover work on crease retention is also being considered. It was also announced that certain matters referring to standards on rayon, received from the American Standards Association, have been referred for action to the various subcommittees dealing with the appropriate subjects.

Mr Dorn then introduced H W Stiegler, who explained that there has been some reorganization of the work at Lowell. He pointed out that he is now in a little better position as a result of the new organization. E P Johnstone is now manager of technical matters at Lowell and G R Thompson has taken over some of the administrative duties.

Dr Stiegler asked that the chairmen get their annual reports to him promptly as they are needed for the '53 *Yearbook*. They should be in the same form as the reports of last year so that they will be uniform. The deadline was set for February 1.

Dr Stiegler gave a short resume of the various projects at Lowell: the research associates are cooperating with the dry cleaning, flammability, and fiber analysis committees; Atlas Electric Devices are engaged in engineering the new dimensional change meter while work is still going on at Lowell, including a study of shrinkage and the effect of variations of drying temperatures on shrinkage; under the reopened American Viscose fellowship a Lowell Textile Institute graduate student, Leo Barish, is working to speed up a shrinkage test for rayon; and work is continuing with the Accelerotor, with special emphasis on dry abrasion. The Accelerotor continues to demonstrate increased versatility, being useful both wet and dry. It is also proving of interest for pilling of the newer fibers.

Dr Stiegler urged that the various committee chairmen pay particular attention to the correlation of their test methods with field tests or experience, adding that it is always very disappointing if a standard test ultimately proves to be not in agreement with field tests or with field experience.

Mr Dorn then introduced George Baxter, Chairman of the Corporate Membership Committee, who expressed great appreciation for the work done by the various committees, particularly in the compilation of reports which furnish his committee with "ammunition." He advised that a drive for additional membership is now under way, with the hope of increasing income from corporate memberships to $60,000 for 1953. He requested the assistance of committee chairmen, pointing out that there is mutual interest in the success of this drive.

RESISTANCE OF TEXTILES TO ABRASION

Dr Stiegler then introduced Max Winkler, Chairman of the Subcommittee on Resistance of Textiles to Abrasion. Mr Winkler reported that the work of his committee, presently concerned with gathering and interpreting data on the Stoll Flex Tester, would eventually include all types of testers. He stated that progress is being made in interlaboratory tests under standard conditions and that, at their next meeting, they expect to consider the results of the Accelerotor work at Lowell. In response to a question from Mr Dorn, as to whether his committee was considering the subject of pilling, Mr Winkler stated that the committee will look into it.

DRY CLEANING

A E Johnson, Chairman of the Subcommittee on Dry Cleaning, reported that they have been evaluating the resistance of flock and metallic prints to commercial dry cleaning, looking toward the development of a test that will predict the results of five commercial dry cleanings. They intend to study the minimizing of redeposition or sample contamination in an accelerated test for color fastness to dry cleaning, and finally the adaptation of the Accelerotor in testing overprinted fabrics for dry cleanability. They are presently working with a Launder-Ometer method using the new Inconel tubes, agitating the samples in perchlorethylene, and it is expected that a new test procedure will be developed in 1953. With reference to redeposition, it was announced that work is being done on proper conditioning of samples and ratio of fabric to solvent. There is some possibility that a test representing the average of five commercial dry cleanings may be too severe for certain fabrics. This may call for an adjustment of the test methods so that by merely varying a time factor, for example, the test would indicate the average of one, three or five commercial dry cleanings. There also seems to be need for a dry cleaning test to evaluate permanence of pleated fabrics. Mr Johnson expressed appreciation for the help of the research associates at Lowell.

Mr Dorn announced that George Hotte had been appointed chairman of a new committee concerned with definitions applying to the fields of dyeing, wet processing, etc. He has also been appointed a representative to the American Standards Association from AATCC on the same subject.

STREAM POLLUTION

Percival Theel, Chairman of the Stream Pollution Subcommittee, reported that national and sectional subcommittees have been planned in order to help the textile industry combat problems of stream pollution. The national committee is made up as follows:

Section	*Representative*
Northern New England	John Dalton
Rhode Island	William Stafford
Western New England	A N Henschel
Hudson-Mohawk	H S Dahlberg
Philadelphia	William H Hughes
New York	E A Leonard
Piedmont	R H Souther
South Central	E A Freeman
Southeastern	Edward Abrams
Midwest	C F Gurnham James Crane
Pacific Southwest	Robert Roth
Pacific Northwest	
American Institute of Laundering	Ralph B Smith

The committees shall concern themselves with industrial wastes only. Their function is to encourage, inspire and promote technical investigations on specific problems. They will cooperate with the National Technical Task Committee on Industrial Wastes and represent the textile wet processing industry on that committee. Other auxiliary objectives have been set up and thus far several of the sections are compiling data. For example, Phila-

delphia is preparing a chart, which is an abstract of existing laws and regulations covering abatement of pollution; the Piedmont Section is compiling a reference bibliography; the Rhode Island Section is preparing a glossary of terms, and the Western New England Section is to prepare for publication a case history on waste treatment. The discussion at a symposium on this subject during the 1952 Convention will be published in the *American Dyestuff Reporter* shortly after it is screened by the Editor of *Proceedings*.

CONTINUOUS WOOL SCOURING

E A Leonard, Chairman, reported for the Subcommittee on Continuous Wool Scouring. This committee has been concentrating on adapting its present tentative test method for grease wool scouring to the evaluation of spinning lubricant scourability from yarns. Thus far they have found two methods for application of oil to clean wool yarns for testing purposes. The first is a single-end padding, using a toluene solution of the oil to be evaluated; the second consists of dipping small clean skeins of wool into a toluene solution of oil followed by centrifugal extraction and drying. Uniform applications of oil from 0.5 to 10% have been achieved. Scour tests on these yarns have produced smooth curves showing identical rankings of oils in four laboratories which were in agreement with results of production work. Further data are being collected with the intention of preparing a paper covering all the work for publication in the *American Dyestuff Reporter*.

SIMPLIFIED CONTROL TESTS

T G Hawley, Chairman of the Subcommittee on Simplified Control Tests, reported that since the last meeting there has been interest expressed in a simplified gas-fading test. His committee is working on two ideas, 1) a treated patch to be placed under the unknown sample followed by the application of a hot iron; and 2) treating cloth in sodium nitrite, drying and dropping phosphoric acid to liberate the active gas. It is recognized that any simplified test must not remove temporary inhibitors from the sample.

DIMENSIONAL CHANGES IN TEXTILE FABRICS

John Warner, Chairman, reported for the Subcommittee on Dimensional Changes in Textile Fabrics. A subcommittee of this group has completed development work on a tentative test method to determine shrinkage of wool knitted fabrics other than hosiery. This test method is being submitted to the General Research Committee. The committee is continuing with its work comparing the present AATCC Standard Test Method 14-33 with the new Federal Specification CCC-T-191b. At the request of the ISO this committee is also undertaking a study of larger loads of dry fabric and longer washing cycles, two points which have been raised by the French and United Kingdom delegates, and with which the American delegates so far have not been able to agree. Two new subcommittees are being established to develop shrinkage test methods in fields which are not adequately covered by our published test procedures; one to cover shrinkage of blankets, and the other to study shrinkage of woven synthetic fabrics with special reference to those made from the newer fibers.

FLAMMABILITY

H E Hager, Chairman, reported for the Subcommittee on Flammability. The standard set up by this committee appears to have been generally accepted. Legislation on a national scale has been submitted but thus far has not been passed, but it is expected soon. The committee is actively handling questions from industry, some of them by reference to the Lowell research group, others by members of the committee. There followed some discussion initiated by Mr Hotte, which brought out that AATCC is not recommending any Federal or State legislation, but is fully aware of the fact that there is need for laws at both levels. This is because of the importance of intra-state as well as interstate movement of textiles involved. It was again brought out that AATCC is concerned *only* with methods of testing that may be involved in any legislation.

Mr Dorn announced that he is preparing a release to the chairmen clarifying their duties. He is expecting two reports annually from each committee.

SOILED CLOTH

George Wiseman, Chairman, reported for the Subcommittee on Soiled Cloth. This committee has been attempting to set up methods of testing soiled cloths in order to be in a position to recommend existing materials if found suitable, or to develop a soiled cloth for this purpose if those available are not suitable. It is found that tests must be carefully controlled if work done in various laboratories is to be in agreement. The calibration of reflectance meters has been found to be particularly important. At the present time there seem to be only two standard soiled cloths offered commercially. The opinion of the committee is that either of these cloths is satisfactory for making comparison of the relative soil removal value of the detergents thus far used in the experiments. Work is continuing to establish that these two soiled fabrics can be used for any and all detergents. In response to a question from Mr Bell it was stated that this committee has not attempted to correlate their information with washing machines or laundry machines.

BLEACHING

T E Bell, Chairman, reported for the Subcommittee on Bleaching. This committee has held five meetings during the year, and as a result of its work has concluded that the standard method described in CCC-T-191b has proved to be satisfactory and should be adopted for measuring tensile strength, yarn count, and fabric weight. With reference to chemical characteristics of bleached cotton the two fluidity methods studied by the committee are in close agreement and with minor modifications can be written up. Sufficient agreement has been found to warrant writing up a method for the determination of ash in cotton goods. Methods for the determination of moisture, oils, fats, waxes and noncellulose content have not been sufficiently investigated to date. Extensive work is continuing on the optical characteristics, the results of which will be announced when the work is completed. This committee will review the proposed International Standards when they are ready.

WASH FASTNESS

C A Sylvester, Chairman, reported for the Subcommittee on Wash Fastness. A large attendance at their meeting the day before arrived at the following conclusions:

1) With reference to ISO recommendations the committee believes that we should recommend our current accelerated series of wash tests.
2) With reference to the IA test the committee must start fresh, get hand washes in order to arrive at an average for comparison purposes.
3) A new test should be worked up providing for alternate exposure to light and washing. Present ideas of tests of this sort seem to show much possibility of variation.
4) More information is needed on the migration of dyes in washing. This factor is of particular importance when, as frequently happens in automatic home washers, the material is allowed to stand wet after washing and before drying. Many tests will have to be run to cover the applicability of proposed tests to cover this feature.

Mr Sylvester reported that the sale of

the Inconel tubes has been sufficiently large to indicate that many people are running the new tests calling for the tubes. For the information of this committee, Mr Bell reported that perborate bleaches are increasing in sale for home laundering. Since our IV-A test covers only chlorine bleach it appears important that the Wash Fastness Committee consider the effect of the perborate bleaches. Mr Sylvester said his committee would investigate.

Dr Stiegler expressed the regrets of the AATCC Research group at hearing of the recent death of Jack Epelberg.

ANTISTATIC FINISHES

K Barnard, Chairman, reported for the Subcommittee on Antistatic Finishes, which had a very large meeting the previous day. It appears from results of work in different laboratories that at the present stage of the work there is no general agreement in figures. There is an encouraging agreement on a rank correlation basis for four different samples but it is evident that much more work is needed before a satisfactory laboratory method or machine is found that will predict accurately the practical commercial value of a treated fabric from an antistatic standpoint. Of the two general methods of evaluating samples it appears that measurement of electrical resistance is most promising towards ultimate solution of this problem. Work is continuing.

BONDED FABRICS

K Barnard, Chairman, reported for the Subcommittee on Bonded Fabrics. He referred to an unusual display of all kinds of bonded fabrics at the recent Boston Convention in connection with Howard E Shearer's talk on "Methods of Producing Bonded Fiber Fabrics". He also reported that the commercial production of nonwoven fabrics has continued to expand to over 15,000,000 lbs annually in the United States. This is a joint committee with ASTM, which has already published tentative test methods for weight of tensile strength by bursting, strip or grab methods.

COLORFASTNESS TO LIGHT

Matthew J Babey, Chairman, reported for the Subcommittee on Colorfastness to Light. Our standard Fade-Ometer method was presented to ISO and met with considerable resistance on the part of the European representatives. This committee will check the Fugit-Ometer and other alternative lamps preferred by the Europeans. In the matter of evaluation of variations between Fade-Ometer and sunlight, Florida exposures have been completed, visually examined and checked in the Fade-Ometer. They are still to be examined instrumentally. This committee is continuing with its work to set up a sunlight test method; work is being done at 12 different places in the United States. Mr Seibert is also collaborating on the new Fade-Ometer. The gray scale has been adopted as a tentative method for the evaluation of light tests. Dr Stiegler is still awaiting a supply of gray scales from abroad. Mr Little commented on the work of this committee in connection with the ISO program.

GAS-FUME FADING

In the absence of H G Scull, C A Sylvester reported for the Subcommittee on Gas-Fume Fading. A new supply of dyed standard cloth has been checked and found satisfactory. This committee has been actively at work on an accelerated gas-fume fading method in which it is hoped that a test requiring two hours will be found equivalent to the results of the present test, which requires from eight to 16 hours.

At this point, for the benefit of the committee chairmen, Mr Dorn discussed the fact that AATCC sponsors a number of standard test cloths. He emphasized that new lots of cloth must be evaluated either at Lowell by our research associates or by appropriate committees before they are offered on the market. He also referred to the ASA's interest in connection with the American Hotel Association. It appears that many materials are bought by this latter association without the benefit of standards. Since test methods will undoubtedly be involved, the present exploratory activity with which we are cooperating will undoubtedly bring AATCC closer to this group.

SNAG RESISTANCE

C A Baker, Chairman, reported for the Subcommittee on Snag Resistance. In accepting the ASTM method, it was recognized that there was a 30% tolerance involved in the method. The efforts of this subcommittee have been devoted to cutting down this rather wide tolerance. They are investigating the sandpaper used and methods of applying the weight used in the test. The committee is also studying Dr Smith's snag pull test, which is a device for measuring the force required to pull a loop from a knitted structure. They are also studying tricot and circular knitted fabrics.

ANALYSIS OF FIBER MIXTURES

E M Lynch, Jr, Chairman, reported for the Subcommittee on Analysis of Fiber Mixtures. The committee has investigated the following three new methods:

1) "Sodium Hydroxide-Sodium Carbonate Method" for removal of wool from wool-Vicara blends.
2) "5% Sodium Hypochlorite Method" for removal of wool from blends with nylon, Orlon, Dacron or dynel.
3) "5% Alcoholic Potassium Hydroxide Method" for removal of Dacron from blends with dynel, Orlon or nylon.

The committee plans to submit the Sodium Hydroxide-Sodium Carbonate Method and the 5% Sodium Hypochlorite Method to the General Research Committee for approval as tentative methods. Additional test data will be collected on the 5% Alcoholic Potassium Hydroxide Method. Mr Baxter expressed the opinion that the final report of this committee might well be considered for release to Corporate Membership.

H E Wilde, Chairman of the Subcommittee on Antimicrobial Finishes on Textiles, reported that his committee is still organizing.

L Little commented on the importance of actual use experience against test methods and pointed out that it might be well for the committee to consider setting up wear tests. It is believed that financial backing for such activities could be secured.

The following reports were submitted for publication in the *Yearbook* but were not read by the chairmen:

Alden D Nute—Subcommittee on Evaluation of Durable Finishes

J Andrew Clark — Subcommittee on Evaluation of Enzymes for Desizing

Carl R Bellwood — Subcommittee on Water Resistance of Fabrics

James R Redmond—Subcommittee on Fire Resistance

The next meeting will be held March 12.

Those present were:

C W Dorn, *Chairman*
H W Stiegler, *Research Director*
G H Schuler, *Secretary*
L S Little, *Chairman, Executive Committee on Research*

E C Atwell
M J Babey
C A Baker
K H Barnard
G L Baxter
T E Bell
J R Bonnar
W H Cady
R J Carey
H C Chapin
J A Clark
C Z Draves
E E Fickett
H E Hager
T G Hawley, Jr
A E Hirst
W A Holst
G H Hotte
R W Jacoby
A E Johnson
N A Johnson
E W Lawrence
E A Leonard
G O Linberg
F Lindsay Jr
E M Lynch, Jr
O F Marks
J B Mellor
J E Norton
A D Nute
C N Rabold
L C Reynolds
R E Rupp
C A Seibert
R B Smith
R H Souther
C A Sylvester
A F Tesi
P Theel
S G Turnbull, Jr
W von Bergen
J F Warner
C A Whitehead
H E Wilde
M W Winkler
G Wiseman
P J Wood
H L Young

Rhode Island Section ——

Studies In Textile Printing — IV
SOME FACTORS INVOLVED IN VAT PRINTING*

R D GREENE AND F FORDEMWALT
Calco Chemical Division
American Cyanamid Company

INTRODUCTION

THE printing of textiles is both an art and a science. The art of the process in itself is far too broad a subject to be covered adequately in a single discussion. There are as many variations in the printing procedures as there are individual printing plants involved. Each specific procedure has been developed by a series of careful adjustments to the prevailing conditions in the individual mill and is that which has been found by practice to give the best possible end result. A discussion of these variations would soon lead to a controversial and confusing situation.

For that reason it seems more profitable for the moment to limit the discussion to an effort to consider some of the more scientific aspects involved in vat printing without attempting to present a detailed discussion of any particular problem. In order to do this it is necessary to isolate the different individual factors in this somewhat complex operation. The degree of importance to be attached to the different factors is not always easily determined. It is hoped that it will be possible to stimulate the interest of the printer in this approach and to initiate a cooperative effort.

Let us first review briefly the sequence of events that take place in the vat printing operation.

1) The dye must first be applied to the fabric in the desired pattern. Aside from the many mechanical details involved it is necessary that the dye be evenly dispersed in a suitable carrier and deposited uniformly on the desired, carefully controlled, areas of the fabric.

2) The printed fabric must be dried. This is necessary in order to obtain chemical stability of the printed paste and also for convenience in the additional handling. If the prints were allowed to remain undried there would be some loss of sulfoxylate from air oxidation. In addition, some prereduction of the dye might occur.

*Presented by R D Greene in the quarters of The Providence Engineering Society in Providence R I, on October 24, 1952.

R D Greene

The printing of vat dyes is discussed in terms of the individual steps through which the dye must pass in the process. Illustrative data are presented on gum penetration, the influence of dye particle size, moisture sorption in dried printing films, dye diffusion, and crocking.

3) The dry print is then steamed. In the steaming operation the dried film of print paste is rehydrated and, because of the high temperature of the steam, the required chemical reactions take place. In these reactions the dye is reduced and becomes soluble as the alkali salt of its leuco form. Because of the limited amount of water present on the fabric at this time, the concentrations of the dye and the chemicals present are relatively high. During the steaming operation the dissolved dye must diffuse from the gum layer into the fibers where it is to be fixed by subsequent treatment.

4) After being steamed the printed fabric is subjected to an oxidizing treatment. In this the leuco dye is reoxidized to its original insoluble form and that portion which has diffused into the fibers becomes permanently fixed in place.

5) The oxidized print is thoroughly soaped. By this treatment all of the excess chemicals, residual printing gum and any unfixed dye are removed from the fabric. The soaping operation also permits some changes in the condition of the fixed dye and oftentimes improves the brightness and the fastness properties of the print.

6) The print is then subjected to finishing treatments. The printing process is essentially completed by the soaping operation, and the subsequent finishing treatments are dependent upon the end uses for which the fabric is being prepared.

EXPERIMENTAL

PRINT EVALUATION —— Before attempting to evaluate the effects of the variables present in any of these steps it is obvious that a satisfactory means of observing the results is essential. An analytical method of measuring the amount of vat dye present in a fabric has been developed and has been described in a series of articles on "Studies in Textile Printing"(*1*), (*2*), (3) published in the *American Dyestuff Reporter* and needs not be described in detail at this time. Briefly, this analytical method measures the amount of dye applied to the fabric by the printing process and also the amount of dye remaining fixed on the fabric after the soaping operation. From these measurements and from the color strength of the completed prints the efficiency of the printing process can be calculated relative to a standard. By proper variations in the printing procedure it is thus possible to measure the effect of the different variables involved in the printing process. This method of evaluating printing is illustrated by Table I. This table lists the measurements made and the methods of calculating the different values. In Table II there are presented data which illustrate an application of this method to a study of the effect of variations in the thickening agent. All the conditions were the same for the three prints; they differed only in the gums used. The first was prepared in a standard vat clear, while, in the case of the other two, experimental gums were used and evaluated in the carriers. It can be seen that, although the standard print showed considerably greater color value than was shown by the second experimental print, the efficiency, that is, the amount of color obtained per unit amount of dyestuff applied, is somewhat less for the standard than for the experi-

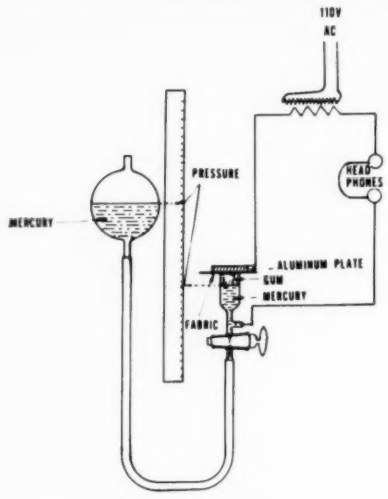

Figure 1
Diagram of Pressure-Penetration Apparatus

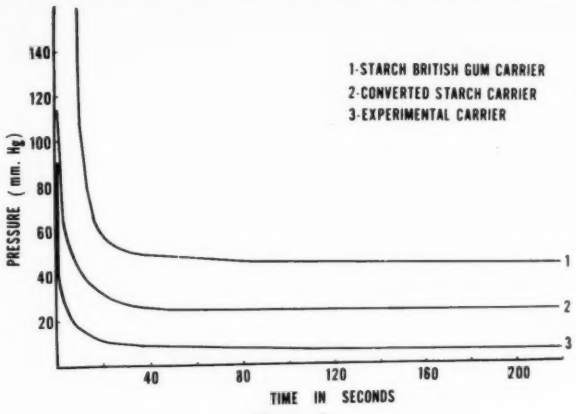

Figure 2
Graph of Pressure vs Time Required For the Gum to Penetrate Fabric

mental print. It seems clear that the strength of a print alone does not necessarily give the true relative money value of the printing process involved.

Many possible variations in the printing operation suggest themselves as subjects for future study. Such factors as the viscosity of the printing paste, the type of engraving, the ease with which the gum wets the fabric and the effect of the adjustment of the doctor blades all need to be given further attention. In addition the material of the fibers and the construction of the fabric and condition of the cloth to be printed must also be taken into consideration.

FLOW PROPERTIES —— An excellent study of the effect of the overall flow characteristics of the gum was carried out by Glarum(*4*). This study led to a considerably clearer picture of the effect of viscosity and thixotropy but gave only passing consideration to the wetting characteristics of the gum for the fabric being printed. An effort has been made to obtain an over-all measurement that would be dependent upon the summation of all these factors. The method set up depended upon measuring the time required for the printing gum to penetrate a rather dense fabric under varying pressures. A diagram of the apparatus used is shown in Figure 1.

A sample of the printing paste under study is placed in the chamber, where it floats on the surface of a column of mercury. The gum is separated from an aluminum plate by a layer of cotton fabric. The apparatus provides for electrical contacts to the aluminum plate and to the mercury column. No current can flow into the circuit until the gum has penetrated the fabric to contact the aluminum plate. As a result of the high conductivity of the gum mix the flow of electrical current will be detected in the head phones the instant the gum penetrates through the fabric to contact the aluminum. The amount of pressure to which the gum is subjected is controlled by the height of the mercury well above the surface on which the gum is supported. In operation the mercury well is raised to the desired position with the stopcock closed. The stopcock is then opened. This subjects the gum to the predetermined pressure. The time required for the first flow of current, that is, the first penetration of gum through the fabric, is then measured. It was found that the time required became greater as the pressure was lowered until a point was reached at which no penetration was observed even on long standing. The rate of penetration was increased by an increase in temperature and was decreased by an increase of viscosity in the gum. In general, plots of penetration of time against pressure were as shown in Figure 2. The greatest difficulty in this method was to find a fabric sufficiently free of pin holes to permit reproducibility of measurements. A cotton jungle cloth generally gave the best results.

SURFACE - TENSION EFFECTS —— Pressures obtainable by the method of study just described were so much less than those obtained in most printing operations that it seemed advisable to examine the whole subject of flow and wettability from a more purely theoretical point of view. For this purpose the fabric may be viewed as containing innumerable bundles of capillaries (Fig 3), that is capillaries

TABLE I

DATA FOR ANALYTICAL EVALUATION OF VAT PRINTS

Measurements Taken
1) Milligrams dye per 100 square centimeters after printing.
2) Milligrams dye per 100 square centimeters after soaping.
3) Color value of print obtained.

Percentage Fixation

$$\frac{\text{Amount of dye Remaining After Soaping}}{\text{Amount of dye Deposited By Printing}} \times 100$$

Color Value

$$\frac{\text{Color Strength of the Test Print}}{\text{Color Strength of the Standard Print}} \times 100$$

Color Efficiency

$$\frac{\text{Color Value} \div \text{Amount of Fixed Dye (Test Print)}}{\text{Color Value} \div \text{Amount of Fixed Dye (Standard)}} \times 100$$

Printing Efficiency

$$\frac{\text{Color Value} \div \text{Amount of Dye Deposited (Test Print)}}{\text{Color Value} \div \text{Amount of Dye Deposited (Standard)}} \times 100$$

TABLE II

EVALUATION OF EXPERIMENTAL THICKENING AGENTS

Gum	*Amt Dep*	*Amt Fixed*	*Color Value*	*Color Effic*	*Print Effic*
St Vat	15.7	11.7(75%)	100	100	100
Expt	17.7	14.2(80%)	120	100	106
Expt	8.3	7.0(84%)	60	100	113

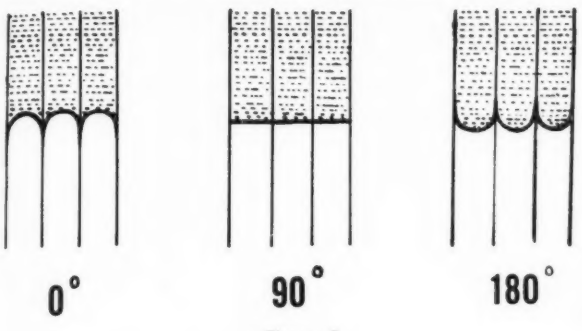

Figure 3
Diagram Illustrating Capillaries and Different Wetting Angles Between Gum and Substrate

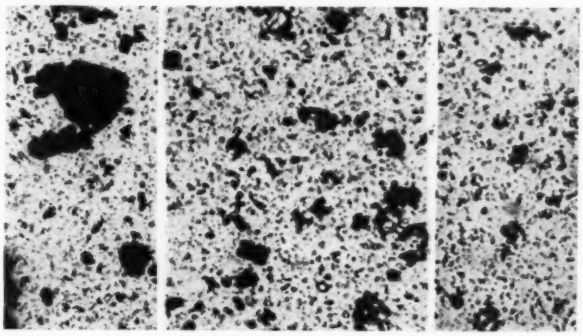

Figure 4
Photomicrographs of 3 Different Particle Sizes

between fibers and between threads.

These are not capable of exact measurement, particularly under the condition of printing, but the influence of the capillaries and of the gum on the flow of a printing paste into a fabric can be subjected to a generalized calculation. While this is somewhat involved, the calculations show that the consideration which should be given to surface tension depends upon the conditions under which the fabric is printed. Not only the surface tension but also the pressure, the compactness of the fabric and particularly the wetting of the fabric by the gum are important. When the gum wets the fabric, i e, when the wetting angle is less than 90°, the surface tension will aid penetration. Spreading or bleeding of the color at the edges of the printed design may result if the wetting angle becomes too small. Similarly, when the wetting angle is greater than 90° the tension will tend to prevent penetration and will tend to keep the color nearer the surface of the fabric. Low printing pressures and compact fabric construction both represent conditions under which surface tension effects become more important.

CONDITION OF THE DYE——It has long been established that the nature and the physical form of the dye itself both play a major part in vat printing. Much time and effort have been devoted to the formulation of printing types that will meet commercial requirements. One of the significant factors of a vat dye for printing is that of the size and shape of the individual dye particles and aggregates. The importance of this is illustrated by a series of experiments in which vat-dye samples, differing only in the size of dye particles, were printed. By sedimentation methods a sample of Vat Pink FF was separated into particles having three different sizes. Photomicrographs of these are shown in Figure 4. When these samples were formulated and printed on cotton under the same conditions, the prints shown in Figure 5 were obtained. The evaluations of these prints against a standard prepared from a commercial dye paste gave the results tabulated in Table III.

Examination of these results shows that, in the case of the unaged prints, the apparent color of the print became greater as the particle size of the dye became smaller. This is in line with the commonly observed effect of size on the color value of pigments. When the prints were aged and developed, however, neither very coarse nor very fine dye particles gave maximum color value. This type of observation seems to indicate that, for best results in vat printing, there is an optimum range of particle sizes. This effect probably results from the fact that, when the particles are too large insufficient fixation is possible and when too small, some color value is lost by unnecessary penetration of the dye too far into the fabric. It can be seen from Figure 5 that the relative color value obtained by the large particle was improved with longer aging times.

In another series of experiments the same dye, Vat Pink FF, was prepared as rather elongated particles by reduction to the leuco form. These are shown in the photomicrographs of Figure 6, and the prints of the same leuco needles are shown in Figure 7.

Here it can be seen that with very fine elongated particles an excellent strong print and high printing efficiency were obtained, but, as the needles became more massive, the strength of the resulting print fell off. When this growth of particles is carried far enough, the prints lose their solidness of appearance and tend to become skittery. This type of growth of leuco particles sometimes occurs when print colors are allowed to stand for several days before printing. Whether such old colors print up bright and strong or weak and even skittery depends very much upon the particular type of crystal growth which has occurred as the dye became prereduced on standing in the prepared paste.

DRYING——In passing from the printing operation to the succeeding steps in the process, it is necessary to pass rather lightly over the influence of drying before aging since little data is available relative to this step. For the most part the essential condition is the removal of moisture and the maintenance of the dry condition of the print to prevent, insofar as possible, premature chemical action and the consequent loss of sulfoxylate. It seems probable that a more careful examination of factors involved in this stage of the process would be profitable.

AGING——

(a) *Moisture Take-up*

The first step involved in the steaming or aging process is that of rehydration of the gum film. The observation and measurement of factors governing this process are not readily available because of the difficulty encountered in sampling and of the unstable nature of the condition of the dye during this stage. Considerable data are available as to the over-all results, and considerable progress in the improvement of this important operation has been made over the years without separate considera-

TABLE III

EVALUATION OF PRINTS OF VAT PINK FF OF DIFFERENT PARTICLE SIZES

Particle Size	*Finishing Efficiency*	*Color Efficiency*	*Printing Efficiency*
Commercial Paste Standard	81	100	100
Largest Particles	57	97	68
Medium-Sized Particles	77	141	134
Fine Particles	83	82	83

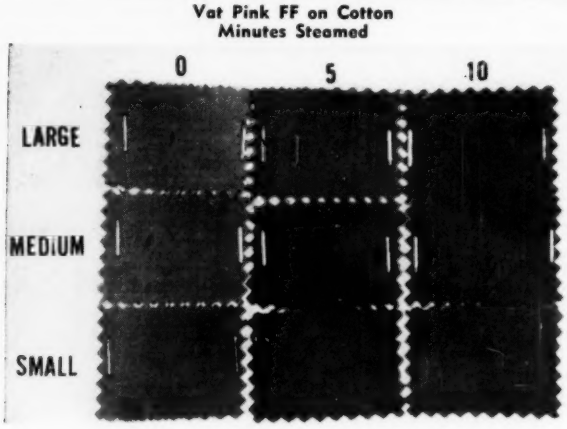

Figure 5
Photograph of Print From Dye Samples
Having Different Particle Sizes

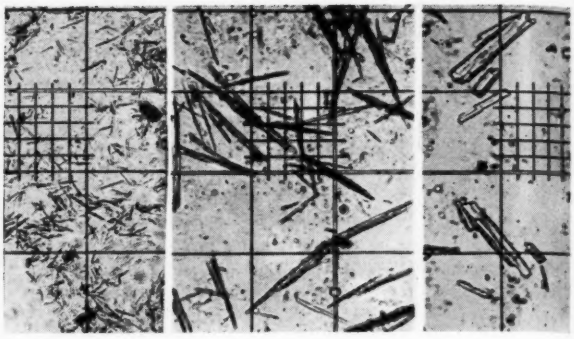

Figure 6
Photomicrograph of Vat-Leuco Needles
of 3 Sizes, Vat Pink FF

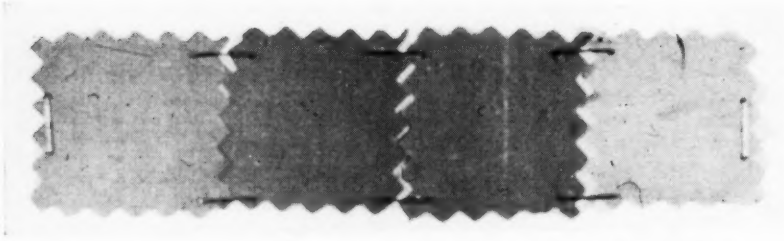

Figure 7
Photograph of Prints from Leuco Dye of Different
Needle Sizes and a Print Prepared from a Commercial
Paste of the Same Dye, Vat Pink FF

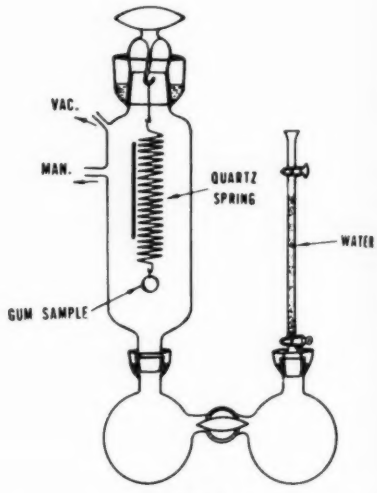

Figure 8
Sketch of Moisture-Sorption Apparatus

tion of the different factors involved. Since both the reduction and the diffusion of the vat dye requires the presence of moisture, a study was made of the rates at which printing gums of different compositions absorbed moisture when exposed to a steam atmosphere. A diagram of the apparatus used for this is shown in Figure 8.

Small amounts of vat printing pastes on microscope cover glasses were suspended on a calibrated quartz spring balance in a glass chamber and dried to constant weight. The entire apparatus was contained in an air thermostat at a temperature of 212°F. Any desired condition of humidity could be created in the chamber by regulating the admission of water through a glass stopcock. In a study of the effects of various humectants in printing gums the different dry pastes were exposed to a humidity of 95%. The rate at which moisture was absorbed by the gum was readily determined by noting the increase in weight. This in turn was determined at all times by simply reading the length of the calibrated quartz spring on which the sample was suspended. The results obtained with the different humectants are presented in Table IV and are shown graphically in Figure 9.

It can be seen that the rate of moisture absorption was quite rapid at first and became slower as more moisture was absorbed. It seems significant that the gum containing no humectant absorbed moisture as readily as many of the gums to which humectant had been added. This suggests rather strongly that such an alkaline gum paste is itself highly hygroscopic and that much of the benefit obtained from the so-called humectants probably comes from other influences. It is known, for example, that several of these are rather good solubilizers for vat leucos.

TABLE IV

EFFECTS OF HUMECTANTS

Humectant in Gum	*Percent Moisture Sorbed in 6 min at 212°F & 95% Relative Humidity*	*Strength of Print Prepared With The Gum*	*Printing Efficiency Obtained With The Gum*
glycerine	20.8	100	100
diethylene glycol	23.0	105	107
ethylene glycol	20.0	105	105
propylene glycol	18.5	100	112
proprietary compound	28.8	100	99
no humectant	23.6	95	98

(b) *Diffusion Through Gums*

After the dye has been reduced to the leuco condition in the ager, it is necessary that this soluble leuco dye migrate by diffusion through the gum layer to reach the fiber surface. Since no dye can become fixed

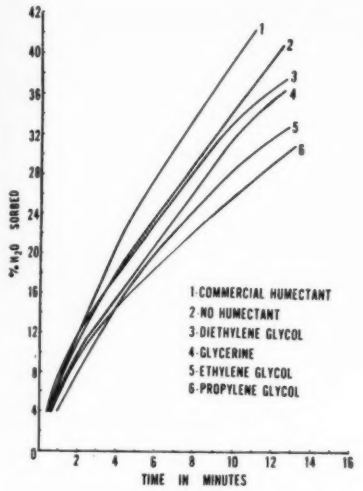

Figure 9

Graph of Moisture Take-up by Gums With Different Humectants

until it has diffused into the fiber itself, the rate at which the dye can migrate through the gum is significant. The condition existing in a dried vat print is illustrated in Figure 10, which is a photomicrograph of a dried printing-gum layer deposited on cellophane. The individual vat dye particles are clearly visible in the printing-gum layer. It can be seen that those portions of the dye in the outer portion of the gum film will have to diffuse through the entire thickness of this layer before they can become effective in coloring the fabric. Any portion of the dye which is still in the gum layer when the print is dried after aging will have no opportunity to become fixed but will be washed off in the soaping operation. Or if not washed off it will remain on the surface and tend to cause crocking.

In order to compare diffusion rates in vat printing gums a method was set up which permitted the vat-dye leuco to diffuse through a very thin wedge-shaped layer of the gum being studied. The principle involved is illustrated by Figure 11. In this method the dye that diffused through the gum layer dyed and became fixed in the cellophane under the gum wedge. By exposing such wedges to longer and longer steaming periods the cellophane strips became dyed over a progressively greater distance since, with increased steaming time, the dye diffused through the thicker portions of the wedge. The appearance of a series of cellophane strips, after mounting for measurement at the conclusion of a test, is shown in Figure 12.

By a simple calculation based on the known angles involved it was possible to find the rates at which the diffusing dye front passed through the gum layer. The

Figure 10

Photomicrograph Showing Vat Particles in Dried Printing Film on Cellophane

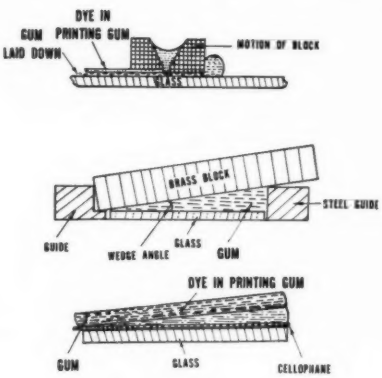

Figure 11

Diagram of Wedge Method for Measuring Diffusion in Gums

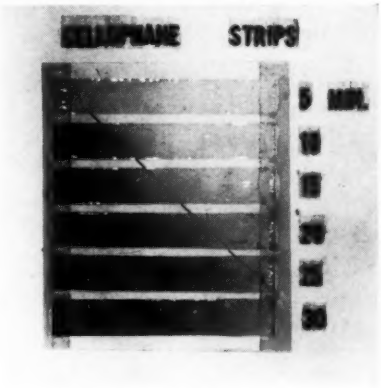

Figure 12

Photograph of Mounted Cellophane Strips Used for Diffusion Study

results obtained for several different vat dyes through one type of starch-British Gum printing carrier are shown in Table V.

It can be seen all of the dyes passed through the gum at approximately the same rate. This observation is in line with that presented by Gerber(5), based on long-time diffusion studies at a lower temperature. The rate became quite different for gums of different compositions, however. It is believed that the importance of this diffusion rate will justify additional experimental measurements of this same kind, particularly to clarify the differences between vat-gum carriers.

CROCKING —— Occasionally, particularly in very heavy shades, the problem of crocking arises in vat printing. A preliminary investigation of such cases has resulted in some interesting observations relative to the distribution of dye. Figure 13 shows photomicrographs of two separate printing pastes. It can be seen that in one the dye is present either as very large individual particles or large aggregates, while in the second the dye is very uniformly dispersed. When printed under similar conditions some crocking was encountered in the first case while the second, or finely dispersed dye, showed no difficulty of this kind. In another series of observations two separate commercial prints of the same pattern were found to differ in fastness to crocking. Microscopic examination of the printed fibers showed the conditions illustrated in Figure 14.

It can be seen that, in one case, there are large aggregates of dye on the fibers, while in the other there are few or no deposits. Where these heavy deposits of color are

TABLE V

RATES AT WHICH THE DIFFUSING FRONTS OF DIFFERENT VAT DYES PASSED THROUGH A STARCH-BRITISH GUM CLEAR

Dye	*Rate mm per min*
Pink FF	0.038
Brown RR	0.041
Golden Orange	0.039
Flaming Orange	0.032
Violet 6R	0.034
Khaki G	0.041

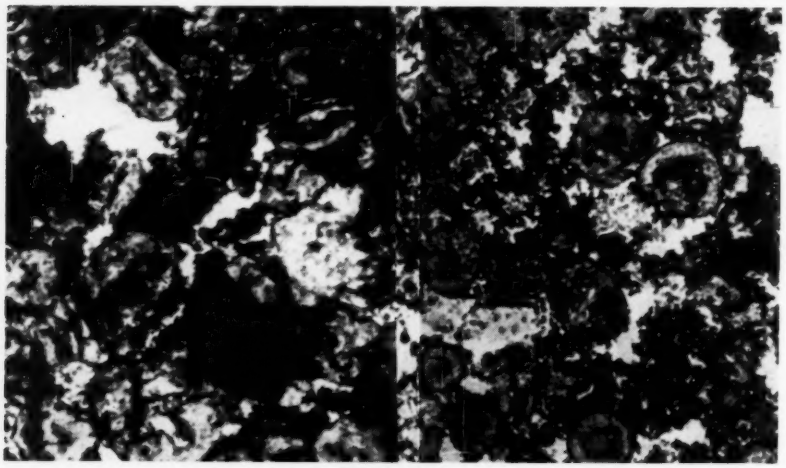

Figure 13
Photomicrograph of Two Different Vat Dyes in Printing Gum

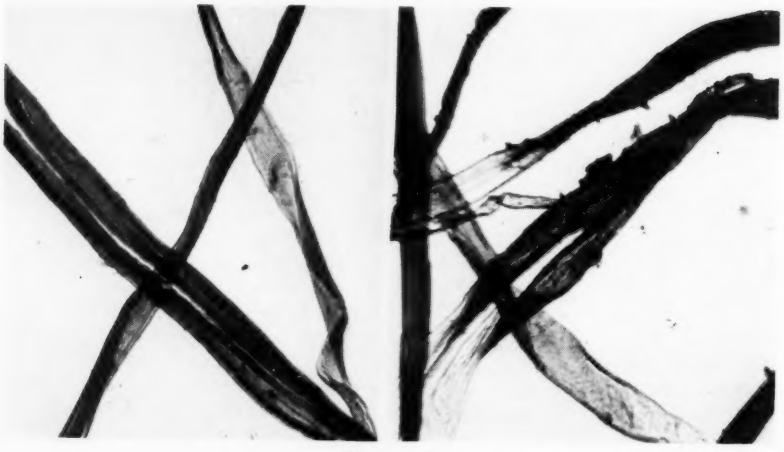

Figure 14
Photomicrograph of Fibers Taken From Prints Showing, In One Case, Unfixed Dye on Fibers

found the crocking is generally bad. Such photomicrographs show only a very few fibers, but these represent a condition which probably predominates throughout the printed area. It seems probable that such large particles of dye remain after the printing operation only because it was not possible for the reducing chemicals to convert such large masses to the leuco form in the time available in the ager. As a result the dye had no opportunity to diffuse into the fibers and become fixed during the aging process. That this was the case is supported further by the observation that, when a second application of chemicals was made by padding on a solution of alkali and sulfoxylate to this print and repeating the aging and oxidizing steps, the crocking was greatly improved and these large aggregates were no longer in evidence. A vigorous soaping will dislodge these loosely adhering particles with an improvement in fastness to crocking. Neither of these procedures, however, is adaptable to production requirements because of the time required for the additional treatment. In the case considered no intentional variation was made between the two prints yet a difference in the results was found. Future investigation will be required to find the cause of the difference in distribution of dye and whether this is inherent in the dye itself or caused by the gum or by the mixing procedure used.

CONCLUSION

Much of the work described has been of an exploratory nature. For the purpose of this discussion only an outline of the methods used and typical illustrations of the results have been presented. Some of the factors examined are unquestionably of major importance in vat printing and should be investigated more fully. A more complete knowledge of the factors involved in the complete process of vat printing will surely lead to better control and to improved results. Neither the dye manufacturer nor the printer alone can hope to carry out all of this work, but a cooperative effort is bound to lead to results of mutual benefit.

ACKNOWLEDGEMENTS

The authors wish to express their appreciation to their associates in the Application Research Department at Calco for help and suggestions, particularly to A F Klein and C R Witschonke for the data on moisture regain and leuco printing, and to the directors who have supported the program of study. A special word of appreciation is due C E Maresh, R R Krammes, and Mrs L D Pesyk for the preparation of the illustrations.

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(4) Glarum, S N, *ibid* **23**, 175 (1934); *ibid* **25**, 150 (1936); *ibid* **26**, 33 (1937); *ibid* **26**, 124 (1937); *ibid* **26**, 437 (1937)
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NOTICE TO SECRETARIES AND PUBLICITY CHAIRMEN OF LOCAL SECTIONS

Papers presented before local sections should be sent to Dr Carl Z Draves, Editor of the *Proceedings*, 30 Lahey Street, New Hyde Park, New York. Authors should provide two copies for this purpose.

Reports of local section meetings should be sent to the American Dyestuff Reporter with copies going to Dr H C Chapin, National Secretary.

Dates of meetings and advance notices of meetings should be sent to the American Dyestuff Reporter with copies also going to Dr Chapin. For publication in any particular issue, information should be in the office of the Reporter 17 days before the issuance date.

Approximately 150 attended the January 30th meeting of the New York Section at the Hotel Statler, New York, N Y, to hear Dr J Fred Oesterling, Chief, Textile and Leather Division, Quartermaster Research and Development Laboratories, Philadelphia, Pa, speak on "The Ideal Military Fabric".

Meeting Report
Rhode Island Section

Providence Engineering Society, Providence, R I
January 23, 1953

AT the January 23, 1953 meeting of the Rhode Island Section at the Providence Engineering Society, Providence, R I, Herman P Baumann of American Aniline Products, Inc, gave a paper entitled "Novelty Printing Effects" and D Donald Gagliardi of Warwick Chemical Co delivered a paper entitled "The Resin Embossing of Acetate Fabrics."

Eighty-five members attended an informal dinner at the Sheraton-Biltmore Hotel before the meeting and over two hundred attended the technical meeting at the Engineering Society.

Respectfully submitted,
R G THOMAS, *Secretary*

(L to r): Herman P Baumann, American Aniline Products, Inc; Ernest J Chornyei, Rhode Island Section Chairman; D Donald Gagliardi, Warwick Chemical Company Division of Sun Chemical Corporation.

Swatches in conjunction with the speaker's talks attract considerable interest.

J W Timperley, R I Section Treasurer (left) examines novelty printing effects on goods exhibited by Herman P Baumann.

A group from Kenyon Piece Dye Works: (l to r): Jas McGibbon, Roland Richards, Geo Gohring, David Curtis, Harold Hopwood and Kenneth C Everett.

(L to r): William Croasdale, Guyan Mills; Joe Quinn, Southbridge Finishing; Dick Mullen, Harrison & Co, John E Derrig, American Cyanamid Co.

(Photos Courtesy of Kenneth C Everett)

Additional Photos of Rhode Island Section Meeting January 23, 1953

Courtesy of
John E Trexise

NEWS

• Chemical Marketing and Economics Division, ACS

At the September meeting of the American Chemical Society held in Atlantic City the Council decided to establish a new division of Chemical Marketing and Economics. This division has as its goal not only the education of its members in chemical marketing and economics but also the objective of keeping abreast of chemical developments and marketing procedures. Nonmembers of the ACS may join the division and application blanks may be obtained from the Secretary-Treasurer, Dr Hal G Johnson, Monsanto Chemical Company, 1700 South Second Street, St Louis 4, Missouri. Dues are $2 annually. Other officers of the Division are F A Soderberg, *Chairman*, General Dyestuff Corp, and C A Setterstrom, *Chairman-elect*, Carbide and Carbon Chemicals Division of Union Carbide & Carbon Corp.

• GAF Announces Price Reductions in Two Glycols

Reductions in the development prices of two of General Aniline & Film Corporation's high-pressure acetylene-derived glycols, butynediol and butanediol, have been announced by Dr Jesse Werner, GAF's Director of Commercial Development.

The price of 35 per cent butynediol solution has been lowered to 20 cents a pound, or 57 cents a pound on a 100 per cent basis. The price of 1,4-butanediol has been lowered to 60 cents a pound.

Technical data and price schedules are available from GAF's Commercial Development Department, 435 Hudson Street, New York, N Y.

OBITUARY

EDWIN F O'BRIEN

EDWIN F O'BRIEN, secretary and treasurer of the Commonwealth Color & Chemical Company, New York, died February 6.

Mr O'Brien is survived by his wife, Mrs Winifred O'Brien, and three sons, Kenneth, Thomas and Edwin.

• Cone Discusses Problems Created by Transition to Buyer's Market

Speaking before the 39th Annual Meeting of the National Association of Finishers of Textile Fabrics on February 4th at New York's Hotel Statler, Sydney M Cone, Jr, in his annual report to the membership stated:

"We realize the effects of the transition to a very definite buyer's market have increased our problems. Some of our friends have gone out of business, some have changed ownership, others have changed in other ways. There has been a considerable relocation in 1952, and some of us have found the cross-currents stronger than in many years. Special technical problems multiplied. Price problems are always difficult in the kind of markets we have experienced.

"Fortunately, volume has been reasonably good, and is expected to continue reasonably good, provided there is no material change in the volume required for the military program.

"Special technical problems will continue to multiply and these add seriously to our costs. They require expensive research staffs and experimental runs, and increase the number of short runs and the variety of processing which run up our costs very quickly. In short, I think we are going to keep pretty busy, but we are going to find it increasingly difficult to make reasonable profits."

In referring to depreciation rates on finishing machinery, Mr Cone said, "It would be of special significance to finishers if the Government were to come up with a more realistic depreciation tax policy."

A revision of the Association's color classification system will soon be completed and the results should greatly enhance the value of this function of the Association, according to the annual report of J E Hoesl, Secretary. A thorough review of the color ranges in the system was made by a technical committee of finishers. On their recommendation the executive committee approved a project to revamp the system and supplement the color ranges with new vat dyes that have appeared on the market since the original system was set up.

The statistical reports on finishing operations and stocks compiled by the Association were completely overhauled during the past year, the report stated. New charts on production and stocks were added to the reports. A program to expand the industry sample of finishing plants now reporting their monthly data to the Association is showing encouraging progress.

In commenting on the work of the Association, Mr Cone praised the staff and its counsel, M C Steen, for efficient handling of Association activities. He further stated:

"We have had the finest cooperation from our members on the numerous working committees of the Association. These members have given valuable time and advice on the Sanforized royalty problem, the color classification problem, other problems of operation and policy, and their work continues into the next year. Your president expresses the thanks of the membership, and his own deep appreciation, to these men for their generosity and assistance."

At a luncheon following the business meeting approximately 200 representatives of finishing plants heard the guest speaker, Marguerite Higgins, foreign correspondent and lecturer, describe her experiences as war correspondent and world traveler.

A complete list of officers elected by NAFTF appears on page 155 under "Names in the News."

• 87 Standards Approved by ASA in '52

The American Standards Association, Inc, approved 87 standards in 1952, according to the annual report issued recently by Vice Admiral George F Hussey, Jr, managing director. The increase brought the total American Standards in effect to 1264.

Company members of ASA now number 2337. Trade associations, technical societies and consumer organizations enrolled in ASA number 114.

Newly-approved standards of particular interest include 51 American Standards for Rayon and Acetate Fabrics, L22 series; and Test Method for Flammability of Clothing Textiles, L14.69-1952.

• Nylon Production at Pensacola to Begin in 1st Quarter of '54

Initial production from The Chemstrand Corporation's nylon plant now under construction near Pensacola, Florida, is anticipated during the first quarter of 1954, according to Murray H Morse of Chemstrand's Sales department.

Addressing the Throwster Group of the National Federation of Textiles, Mr Morse stated that the Chemstrand nylon plant, designed to produce at a capacity of 50,000,000 pounds annually, will probably come into full output eight months after the initial start-up.

"A full range of deniers is planned," he said, "from 15 denier monofilament through the tire yarn size of 840 denier."

Construction on the Chemstrand nylon plant has made good progress, Mr Morse stated, describing for the audience the facilities that will comprise this country's first wholly-integrated nylon production facility. Some 30 buildings and storage tanks are under construction on a 2,000 acre site 14 miles north of Pensacola. Operating staffs already are occupying the main office building. Roy G Hemminghaus is the manager of Chemstrand's nylon plant.

The company also is in the completion stage of its Acrilan acrylic fiber manufacturing facilities near Decatur, Alabama, where it also has its general administrative headquarters and its multiunit research and development center.

• Temple President Addresses PTI Alumni at 52nd Banquet

Members of the Alumni Association of the Philadelphia Textile Institute on Feb 6 heard Robert L Johnson, president of Temple University, stress that "good public relations spring from good personal relations."

Speaking before the 52nd Annual Banquet of the Association at the Warwick Hotel in Philadelphia, Dr Johnson told his audience that "the way you handle yourselves as you go about your tasks will either bring you outstanding success, mediocrity or complete failure."

Edwin G Michie, Andrew Y Michie and Sons and Co, president of the Alumni Association, was toastmaster. William A Popp of William A Popp and Associates, was chairman.

Guests of honor included Millard E Gladfelter, provost and vice president of Temple University; Earl R Yeomans; Richard S Cox, dean of PTI; Theodore B Hayward, chairman of board of trustees of PTI; Rinaldo A Lukens, president of PTI; Bertrand W Hayward, director of PTI; Frank P Zurn, chairman of the board of governors of PTI; and Fred C Scholler, president of PTI Foundation.

• Hatch Textile Research Now a Corporation

Herbert H Hatch, president, has announced that, due to Hatch Textile Research's continued growth of testing service, the firm has incorporated and will now be known as Hatch Textile Research, Inc. There will be no change in management or policy, it is stated.

Established in 1926, the laboratory is situated at 25 East 26th Street, New York, N Y.

The officers of the corporation, in addition to Mr Hatch, include John W Sheppard, Vice President, and Eleanor F Hatch, Secretary-Treasurer. Mr Sheppard, during the past five years, has been Assistant Director of the laboratory. Previous to that, he was associated with the laboratories of General Dyestuff Corporation and the American Viscose Corporation.

Adolph Marklin, who has just completed twenty-three years with the laboratory, remains as senior technologist.

For the past forty-four years Mr Hatch has been professionally engaged in his own business. In 1908, he entered his father's textile adjusting firm, which had been established in 1880. Since 1926, he has devoted his entire attention to testing for construction and serviceability of fabrics.

• TDI Forum Well Attended

The third in a series of forums on manmade fibers and their relation to modern converting, held Thursday, January 15 at the Hotel McAlpin, New York, under the auspices of The Textile Distributors Institute, Inc, attracted a large crowd.

The new dynel and Vicara fibers were spotlighted as experts in production and merchandising techniques discussed current converter problems. A question and answer period followed each presentation. Exhibits of the finished products of the respective fibers were on display to demonstrate their potentialities and effective end uses in addition to their beauty and versatility.

Carl A Setterstrom, sales manager, Textile Fibers Department, Carbide & Carbon Chemicals Co (A division of Union Carbide & Carbon Corp) spoke for dynel.

The Vicara presentation was made by Jesse F Yeates, Jr, sales manager, Fiber Division, Virginia-Carolina Chemical and other representatives of Virginia-Carolina Chemical Corp.

Charles W Carvin, Sr, Charles W Carvin Co, Inc, served as forum chairman, assisted by George Greenspan, Cantor Greenspan Co, Inc, Nat Leavy, Goldstein & Leavy, Inc, and Walter Ross, J Rosenholz, Inc.

• Glyco Products 25th Anniversary

In looking back over their first twenty-five years, Glyco Products Co, Inc, Brooklyn, N Y and Williamsport, Pa, reflects considerable growth.

Its first products were polyol derivatives used in small volume but filling a definite need. Today, in their 25th anniversary year, they make over a hundred synthetic organic derivatives. The principal products are edible and technical surface-active agents, synthetic waxes and plasticizers.

The new plant at Williamsport, Pa, covering about 30 acres with 150,000 sq ft of building space, has four railroad sidings.

The company now has about 150 employees. New processes now in the pilot stage should increase this substantially.

This plant contains the most modern and efficient equipment, designed and installed by the H K Ferguson Co.

• "Karbate" Equipment Films

At a press preview on February 6, National Carbon Company screened two new, fast-moving color motion pictures titled "Meeting the Challenge" and "By Way of Experience," produced to describe and demonstrate the nature, uses and practical installation of the Company's "Karbate" Impervious Graphite corrosion-resistant equipment.

In recent years, National Carbon has been presenting a series of demonstration-lectures in industrial plants as a service to users of its equipment and to those planning plant expansion. The new films are intended to expand this activity by booking through the Company's Cleveland Office and seven District Offices.

"Meeting the Challenge," (running time 14 minutes) deals with equipment design and process application. "By Way of Experience," (running time 12 minutes) depicts proper installation and maintenance techniques. The first film traces the history of "Karbate" Impervious Graphite —why the material was needed; experiment and development; physical and chemical properties; specific applications in modern process industries. Especially featured is a diagrammatic sequence showing a processing plant completely constructed of "Karbate" Impervious Graphite equipment components. The second film demonstrates the ease and practicability of assembling, installing and maintaining such equipment as pipe and fittings, joints and couplings, heat exchangers, valves, towers. An important sequence shows the step-by-step procedure in alteration of a large "Karbate" unit in the field. Both were photographed on location at chemical processing plants and in National Carbon shops.

• Cyanamid de Mexico S A to Handle Calco Dyestuffs

Cyanamid de Mexico S A announced on February 16th that the Calco Chemical Division's entire line of dyestuffs will be added to the products distributed. These dyestuffs, numbering over 1,000, will be made available to ten or more different industries in Mexico, including textiles, leather, food, paper and plastics.

Since 1939 these dyestuffs have been distributed by the Dyestuffs Department of Establecimientos Mexicanos Colliere and this Department has now been transferred to Cyanamid de Mexico.

Cyanamid de Mexico S A, formerly known as Reactivos S A, recently expanded its activities beyond the mining chemicals which it has distributed since 1926 to include the entire range of American Cyanamid Company's textile finishes, agricultural chemicals and insecticides. Among the products now distributed by the firm are American Cyanamid Company's complete line of Aerotex resins.

• AATT Symposium and Luncheon

"New Textile Horizons Through Technology", theme of a symposium designed to interpret the role of technology in predetermining market possibilities for the new fabrics, served as the focal point of the February 3rd meeting of the American Association of Textile Technologists.

Held in the Grand Ballroom of New York's Statler, the meeting featured the following technical program:

MORNING SESSION

Chairman—George H Hotte, A M Tenney Associates

Introductory Remarks—Erb N Ditton, Gotham Hosiery Co, Inc

"Technological Development of Apparel Fabrics"—Walter E Scholer, American Viscose Corp

"Technological Development of Home Furnishing Fabrics"—Otto J Haufe, Turner Halsey Co

"Technological Development of Industrial Fabrics"—Herbert R Schwarz, Wellington Sears Co

LUNCHEON

"New Textiles Horizons Through Technology"—Marvin R Cross, Greenwood Mills

AFTERNOON SESSION

Panel Discussion—Prepared and Floor Questions, Clare W Bendigo, American Cyanamid Co, *Chairman*

Members of the panel included:

J Robert Bonnar, General Dyestuff Corp; E H Decker, Hess Goldsmith Co; Charles W Dorn, J C Penney Co, Inc; Ralph M Gutekunst, Hellwig Dyeing Corp; Otto J Haufe, Turner Halsey Co; Robert Helfenbein, Golden Decorative Fabrics; Clark M Heydon, United Piece Dye Works; Frederick F Hubach, Princeton Knitting Mills; Richard T Kropf, Belding Heminway Co, Inc; Waldemar Kuenzel, Deering, Milliken & Co, Inc; Charles A Lasky, Celanese Corp of America; Samuel Lippincott, American Viscose Corp; Joseph Meierhans, J P Stevens & Co, Inc; A L Peiker, Calco Chemical Div; Ernest Pfeiffer, Robbins Mills, Inc; Leo Rainard, Alexander Smith, Inc; Millard K Ryan, E I du Pont de Nemours & Co, Inc; Herbert R Schwartz, Wellington Sales Co; W Bailey Sellars, Burlington Mills Corp; H E Shearer, American Viscose Corp; George B Suhrie, Fox-Wells Co, Inc.

Leonard S Little, textile consultant, served as general chairman of the meeting assisted by the following committee members:

Exhibits—Larus R Burgess (Cone Mills Corp); Finance—Olen F Marks (Industrial Rayon Corp); Luncheon Arrangements—George L Baxter (Bradford Dyeing Ass'n); Printing—George E Linton (Fashion Institute); Publicity—Kenneth A Howry (Daily News Record); Reception—Cameron A Baker (U S Testing Co); Registration—A Frank Tesi (Celanese Corp).

• USTC Textile Course

The United States Testing Company, Inc, has announced the 16th Summer Refresher Course in Textiles and Testing Techniques (s-275) will be conducted during the second half of the Teachers' College Summer Session, Columbia University, July 27 to August 14, 1953. The course will be held at the United States Testing Company's main laboratories in Hoboken, New Jersey. This marks the fourth year Teachers' College has accredited the course for 3 points toward a degree.

The course is open to representatives in the fields of home economics, education, retailing and others who have had some elementary textile training. Through lectures, demonstrations, and practice sessions, students will cover all phases of analyses on textiles and related merchandise, identification of fibers, chemistry, detergency and research. Special emphasis will be given to the various textile processing and finishing techniques. Field trips are scheduled during the course to supplement the class work.

For further information and application forms, write to: Miss Dorothy McDonald, Director, Consumer Service Division, United States Testing Company, Inc, 1415 Park Avenue, Hoboken, New Jersey.

• New Licensee for Nylon

The Du Pont Company announced on February 9 that it has licensed American Enka Corporation to manufacture nylon fiber.

Nylon has been under constant development and improvement since it was commercially introduced in 1939. However, its acceptance is said to have overshadowed the capacity to produce the fiber in sufficient quantity to satisfy demands in spite of Du Pont's constant expansion program which has more than tripled nylon production since the end of World War II.

Du Pont's decision to license other manufacturers to produce nylon was made several years ago. In June, 1951, Du Pont signed an agreement with The Chemstrand Corporation, now completing a nylon plant in Pensacola, Florida. It is pointed out that both Enka and Chemstrand will be entirely independent producers with licenses covering the entire process, beginning with the manufacture of intermediates and ending with the production of the finished nylon fiber.

• New Equipment at LTI General Testing Lab

Three pieces of abrasion testing equipment have been obtained by the General Testing Laboratory at Lowell Textile Institute, it has been announced by Jacob K Frederick, Jr, professor in charge. The three machines, purchased with funds made available by the Massachusetts legislature, are the Stoll-QM surface and flex abrasion machine as manufactured by Custom Scientific Instruments, Inc; the Schiefer uniform abrasion machine made by Sherman W Frazier; and the latest research model (No. 140) of the Taber abrasion machine produced by Taber Instruments Corp.

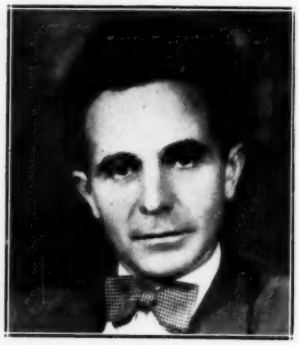
Two basic reasons prompted the Institute in purchasing these instruments, according to Professor Frederick. First was the basic educational import, and secondly, the possibility of opening up new avenues of applied research in this general area and providing suitable subjects for theses work.

• Schibley Solvents Named Agents in Ohio

American Resinous Chemicals Corporation and American Polymer Corporation have announced the appointment of Schibley Solvents & Chemicals Company, 1940 East Sixth Street, Cleveland 14, Ohio, as sales agents in that state.

Loren Schibley, principal, is associated with Schibley & Ossmann, Inc, who have been agents for major chemical companies in the area for more than 25 years. Associated with Mr Schibley is Orville Heinicke.

NAMES IN THE NEWS



H Ruegg

W H Spuhler

ULTRA CHEMICAL WORKS, INC, Paterson, N J, have announced the election of the following officers:

HENRY RUEGG as Chairman of the Board; WILLIAM H SPUHLER as President; ALBERT SHARPHOUSE as Treasurer and Secretary.

Dr Ruegg continues to serve as General Manager in charge of operations; Mr Spuhler maintains his post of General Sales Manager; and Mr Sharphouse, who has been Technical Director for the past 10 years, will remain in that capacity. CHARLES A BAUMAN has also been named as Controller and Director of Purchases.

Ultra Chemical Works operates three plants in Paterson, N J; Joliet, Ill; and Hawthorne, Calif. Executive offices are in Paterson.

Dr Ruegg and Mr Spuhler have had over 25 years experience in industry.

AT the Annual Meeting of the American Textile Machinery Association held February 3rd at the Sheraton Plaza Hotel in Boston, the following officers and directors of the Association for the year beginning February 3, 1953, were elected: FREDERIC W HOWE, JR, Crompton & Knowles Loom Works, was elected President of the ATMA, succeeding J HUGH BOLTON; W FRANK LOWELL, Saco-Lowell Shops, was elected Vice President; JAMES E HOLLIS, Crompton & Knowles Loom Works, was elected Secretary; SAMUEL F ROCKWELL, Davis & Furber Machine Co, was elected Treasurer.

The following directors-at-large were all re-elected to office: THOMAS H WEST, Draper Corporation; R G ROSS, Barber-Coleman Co; Mr Lowell; J EBERT BUTTERWORTH, H W Butterworth & Sons Co.

The Division Directors were also re-elected as follows:

Division I—J Hugh Bolton, Whitin Machine Works.

Division II—Samuel F Rockwell.

Division III—Frederic W. Howe, Jr

Division IV—JAMES H HUNTER, James Hunter Machine Co.

Division V—ROBERT LEESON, Universal Winding Co.

Division VI — WILLIAM H ROMETSCH, Fletcher Works.

REDMAN PROCESS AMERICAN CORPORATION has announced the election of EARLE E WEST as president and director, effective February 16th. RAYMOND H STYLES has been acting as president since the organization's incorporation in Delaware last August, replacing a New York corporation of the same name, and he has now been elected a vice president. Mr Styles advises that Mr West has resigned as secretary of the Underwear Institute after 18 years service in that position.

Mr Styles has stated that effective January 1st, 1953, an agreement was entered into with FRANK R REDMAN, inventor of the Redman relaxation shrinkage process, whereby the Corporation has the exclusive right to promote and exploit the process and the trade-mark "Redmanized" in the United States. The Corporation has taken over various outstanding licenses covering the use of the process and trademark.

Mr Styles pointed out that Mr Redman will be actively associated with the enterprise as consultant, and that a substantial interest in the Corporation has been acquired by Procter & Schwartz, Inc of Philadelphia, builders of the machinery for the process.

It was stated by Mr Styles that an exclusive license for the knit outerwear field in the United States has been entered into with a corporation called Redman Process Knit Outerwear, Inc of which Mr Redman is president, which will develop the process in that segment of the industry. He said that Knit Outerwear License No. 1 had been issued to Allen Knitting Mills, Inc.

Mr Styles explained that all of the common stock of Redman Process American Corporation had been sold, and that arrangements are being made for the sale of an issue of preferred stock at $1.00 a share. He says that it is contemplated not only to have ample funds for the exploitation, promotion and protection of the process, patents and trademarks, but also to develop every avenue of service to the licensees and buyers of knit goods and to publicize the benefits of the process to the public.

Mr West, whose duties will include the development of the licensing program and other trade relation phases of the program, will have available to him in connection with fiscal matters EDWARD LEFF of 320 Fifth Avenue, who has a private practice as a CPA, and who has been elected secretary and treasurer of Redman Process American Corp.

In connection with technical service matters, NORMAN A WORTHINGTON has been engaged as technical service manager, and will likewise service the licenses of Redman Process Knit Outerwear Inc. Mr Worthington has been connected with Mr Redman and with Proctor and Schwartz for a number of years, during which he spent his entire time assisting with development of the Redman Process and demonstrating it, as well as handling testing and other service features.

Mr West's knowledge of knit underwear dates back to his boyhood when he worked in his father's mill in Syracuse, N Y. Following college, he became associated with Fred W Taylor, industrial engineer, in production controls and industrial operations. After World War I he became connected with a firm of industrial engineers for which he installed production controls at Continental Motors, and standard cost methods for several knit underwear mills in the Utica area. When his father died in 1923, Mr West joined with his brother in operating the family mill for two years, after which he started his own mill, making warp and circular rayon underwear. He later became sales manager of R L Carter Co, which ultimately was sold to Stanley Works, where he spent about two years training personnel. He joined the Underwear Institute in 1934.

GEORGE G CREWSON has been appointed technical consultant to the administrative staff of the Chemical Divisions, Food Machinery & Chemical Corporation, New York, N Y, which include Buffalo Electro-Chemical Co, Inc, Niagara Chemical Division, Ohio-Apex, Inc, and Westvaco Chemical Division.

A technical consultant in the office of the Chief of Chemical Warfare Service at Washington during World War II, Mr Crewson has for the past decade been director of engineering, Buffalo Electro-Chemical Co in charge of engineering, construction and process improvement in connection with hydrogen peroxide processes used in the Company's Buffalo, N Y and Vancouver, Wash plants. He will continue in his present post at Buffalo Electro-Chemical Company but will also be available for consultation by all FMC division and plants.

* * *

Westvaco Chemical Division has announced these changes of sales personnel at its New York office:

ARTHUR F SMITH has been appointed Staff Assistant to J C THOM, manager of sales. Mr Smith, formerly divisional sales manager in charge of alkalis, has been associated with Westvaco over the past ten years, serving in various sales capacities, among them divisional sales manager for barium chemicals and solvents.

JAMES G BRONSON was named divisional sales manager in charge of alkalis. Previously, he had been divisional sales manager for barium and miscellaneous chemicals, and assistant divisional sales manager of magnesias.

Two appointments have been made in the Barium Chemicals Division: FRITZ von BERGEN, formerly in charge of the Market Development Section of the Technical Sales Division, becomes Manager and JULES D GILBERT has been promoted to assistant manager. SUMTER A COGSWELL succeeds Mr von Bergen as head of the Market Development Section of the Technical Sales Division.

APPOINTMENT of M W GAYLORD to the post of Assistant Manager of the Research Administration Section of the Research Department of Koppers Company, Inc, was announced on February 9th by G F D'ALELIO, Vice President and Manager of the Department. Mr Gaylord will be located at the Verona, Pa, Research Center of Koppers Research Department.

Mr Gaylord joined Koppers in 1939 as a cadet engineer at the Company's St Paul, Minn, plant. In 1949 he was named Production Manager of Koppers Gas and Coke Division, a post he held previous to his latest appointment.

W B Amos

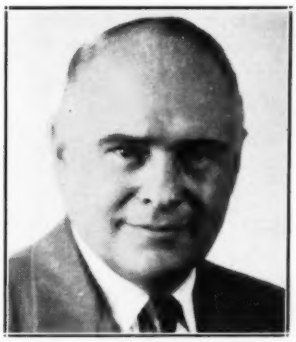
R E Staples

WILLIAM B AMOS and ROBERT E STAPLES have joined the sales staff of Stein, Hall & Co, Inc, New York, and will work out of Southern offices.

Mr Amos, current treasurer of the Southeastern Section, AATCC, will cover the Alabama and Georgia areas from the Atlanta office. Mr Amos, a native of La Grange, Ga, was formerly assistant superintendent of dyeing and finishing at the Eagle & Phoenix Division of Reeves Brothers. He had been associated with the latter firm for 16 years.

Mr Staples will cover the Tennessee and western North Carolina areas from the Charlotte, N C, office. Mr Staples came to Stein, Hall from Hoosac Mills, where his duties included general engineering, costing and trouble-shooting.

R C Conn



J Callicott

R C CONN hash been appointed Departmental Technical Director in charge of textile resins process development and Chairman of the Technical Committee of Textile Resins for the Calco Chemical Division, according to a Feb 9th announcement by American Cyanamid Company.

Dr Conn is a member of the American Chemical Society, the American Association of Textile Chemists and Colorists, an associate member of the American Institute of Chemical Engineers and a member of Lambda Upsilon and Sigma Xi, honorary scientific societies.

L L GROMBACHER, President of Standard Chemical Products, Inc, Hoboken, N J, has announced the appointment of JOE CALLICOTT as a southern sales representative. Mr Callicott was formerly an operating executive with Claussner Hosiery Mills, Paducah, Ky, in charge of dyeing, finishing and quality control. He has wide experience in the hosiery field, having also been manager of the Se-Ling Hosiery Mills, Nashville, Tenn, and previously was affiliated with the Davenport Hosiery Mills, Chattanooga, Tenn. Mr Callicott will make his headquarters at Athens, Ga.

MARTHA RIEFF has joined the staff of American Woolen Co, 225 Fourth Avenue, New York, as color coordinator and stylist of the Women's Fabrics Division.

THE New York Chapter of The American Institute of Chemists has elected SAM COHEN, technical service representative of the Glyco Products Co, Inc, a Councilor.

F T Simon

M A Minnig

J A Okey

FREDERICK T SIMON, formerly Head of the Color Department, Peerless Woolen Mills, Rossville, Ga, has been named Director of the Textile Laboratory, Good Housekeeping Institute, Hearst Magazines, Inc, New York. He succeeds WILLIAM E COUGHLIN, who has gone with Celanese Corporation of America.

Mr Simon began his career with the Calco Chemical Division, American Cyanamid Co, and later went with the Philadelphia Quartermaster Depot Research Laboratories. Following that, he became Head of the Spectro Lab at Sidney Blumenthal & Co before joining Peerless Woolen.

Mr Simon is active on AATCC's Sulfur Aging and Color Committees. During 1950-51 he served as Chairman of the latter committee.

JOHN FULLER has been named Canvex technical service advisor to the clothing manufacturing trade by Kendall Mills. In this capacity he will work with clothing manufacturers who are using Kendall Mills' new specialty product, Canvex coat-front interlining, for the new synthetic suits as well as the all-wools.

Mr Fuller has been with Kendall Mills 15 years. He was formerly in the company's research and development laboratories at the Slatersville, R I, Finishing Plant.

For the past year, he has been quality control engineer for Kendall's Clex, a fusible interlining, assisting shirt manufacturers in the production of top-quality fused collars. He also will continue in this capacity.

FRANK B POPE has been named manager, Pharmaceutical Sales, National Aniline Division, Allied Chemical & Dye Corporation, New York, N Y. Until recently, Dr Pope was attached to National's Chicago office in the sale of intermediates and pharmaceuticals throughout the mid-West. He was formerly connected with Sharples Chemicals, Inc, and the Chemical Research Department of B F Goodrich Co.

MAX A MINNIG, vice president and national sales manager of rubber chemicals for Witco Chemical Company, has been made director of sales for the company. Mr Minnig joined the company in 1946 in the Natural Gas Division, Carbon Black Operations.

Appointed assistant to Mr Minnig is WILLIAM WISHNICK who came to Witco in 1949. He began his career with Witco in the Chicago Asphalt Sales Division.

FOLLOWING a regular general meeting of the Textile Technical Federation of Canada at Hamilton, Ont, the appointment of ERIC DAWBER as executive secretary and head of the federation's permanent secretariat at 1410 Guy St, Montreal, was officially announced on February 12th.

Mr Dawber has been acting as executive secretary since last October succeeding JOHN MERRIMAN. A native of England, Mr Dawber is a former newspaperman and public relations official.

W Pearson

WILLIAM PEARSON has been named technical service representative in Georgia, Tennessee and Alabama where he will be working with W E H SEARCY, technical sales representative in that territory, according to an announcement by Warwick Chemical Company, Division of Sun Chemical Corp, Long Island City, N Y.

Mr Pearson moves from Warwick's Application Laboratory at Wood River Jct, R I, where he had been located since joining the Company last year. From 1946 to 1952 he had been with Crystal Springs Bleachery, Chicamauga, Ga, the last two years of which he was in charge of the Printing Department.

THE appointment of JOE A OKEY as Southern Sales Representative for Crown Chemical Corporation, Providence, R I has been announced by Fred C Grant, General Sales Manager. Mr Okey will cover North Carolina and portions of South Carolina and Virginia.

Mr Okey founded and presently operates Graham Chemical Co, Graham, N C, where he will make his headquarters.

Prior to affiliating with Crown, Mr Okey was associated with National Aniline and later American Aniline Products Inc, in Charlotte, N C.

Most recently Mr Okey served as President of Burlington Engineering Co, which he organized in 1944 and operated until 1951.

JAMES S WALKER has been named manager of technical service of Hooker Electrochemical Company, according to an announcement made by R E Wilkin, general sales manager of the company. Mr Walker has been employed by Hooker since 1940. He has served in various capacities as operator, chemist and process foreman. In 1947 he was promoted to the sales department as technical service representative and in 1950 he became technical service supervisor.

THE Bryant Chemical Corp, North Quincy, Mass, has announced the addition of RICHARD BOYDEN to their research staff at the Hingham Laboratories.

Mr Boyden has just completed four years with the Army Chemical Center in Maryland, where he was a scientific research assistant.

Prior to his army duty he was employed in the laboratories of the Mt Hope Finishing Co in Dighton, Mass.

SYDNEY M CONE, JR was reelected president of the National Association of Finishers of Textile Fabrics at the 39th Annual Meeting of the group at the Hotel Statler, New York, on February 4th. Mr Cone is president of Cone Finishing Co, Greensboro, N C. ARTHUR G POOR, Standard Bleachery & Printing Co, Carlton Hill, N J, chairman of the executive committee was also reelected. Other officers reelected by the group were WALTER HOWELL, Bradford Dyeing Association, Westerly, R I, and H M BURKE, Dutchess Bleachery, Lockwood-Dutchess, Inc, Wappinger Falls, N Y, who continue to serve as vice presidents, with JOSEPH E HOESL, association secretary, as treasurer.

Three new members were elected to the executive committee to serve for one year: C SCOTT LEWIS, Fairforest Co, Spartanburg, S C; ROYCE PHARR, U S Finishing Co, Norwich, Conn; and CHAS N ROBERTSON, III, Robertson Bleachery and Dye Works, New Milford, Conn.

Incumbent members of the executive committee reelected to serve one year: ROBERT AMORY, Springs Mills, Inc, Lancaster, S C; J M COLE, Cold Spring Bleachery, Yardley, Pa; E R FARRELL, Mansfield Bleachery, Mansfield, Mass; W O FORSSELL, Slatersville Finishing Co, Walpole, Mass; A O JOSLIN, Rock Hill Printing & Finishing Co, Rock Hill, S C; LAWRENCE MARX, JR, Clearwater Finishing Co, Clearwater, S C; JULIAN ROBERTSON, North Carolina Finishing Co, Salisbury, N C; J A SIMMONS, Lanett Bleachery & Dye Works, West Point, Ga; and JOHN WARD, Bellman Brook Bleachery, Fairview, N J.

Members reelected to serve for a three-year term expiring January 1956 were: WILLIAM BERRY, Riegel Textile Corp, New York, N Y; WILLIAM BROADFOOT, Aspinook Corp, Jewett City, Conn; ARTHUR POOR, Standard Bleachery & Printing Co, Carlton Hill, N J.

In addition to the above, the following members of the executive committee continue to serve unexpired terms as follows:

Term expiring January 1954: C B HAYES, Pacific Mills, Lyman Div, Lyman, S C; A L GARFINKEL, Lowell Bleachery, Inc, St Louis, Mo.

Term expiring January 1955: G D HARRISON, Pepperell Mfg Co, Lewiston Division, Lewiston, Me; W R MacINTYRE, Joseph Bancroft & Sons Co, Wilmington, Del; G E SINKINSON, Sayles Finishing Plants, Saylesville, R I.

NEW PRODUCTS AND DEVELOPMENTS

• Therma-Sec Process

The United Piece Dye Works, New York, has developed a metallic-insulating process applied directly to the back of outerwear fabrics in conjunction with Unisec-processing, thus combining insulating properties with durable water repellence, stain resistance and permanent wrinkle resistance. Processing combining the above fabric features will be trademarked Therma-Sec.

Now out of the laboratory stage, the process is offered for use on smooth as well as textured surfaces, such as gabardines and fancies, in acetate-rayon, rayon-nylon blends and blends of the new synthetics.

Tests are said to show that heat-retention properties of fabrics processed with Therma-Sec are materially increased in comparison with the same fabrics—untreated. It is claimed that the Therma-Sec process has unusually good dry-cleaning properties. Its properties are reportedly the same as those for United's Unisec-processed fabrics. The processing, which is applied with unusual uniformity, does not affect the color of the face, it is stated.

Anticipated uses for Therma-Sec fabrics include outerwear of all types, such as coats, jackets and stormwear, snow suits, ski-wear and rainwear for men, women and children.

The metallic insulating process is also being applied in conjunction with Unidure-processing for uses where only heat retention and wrinkle resistance are desired. This processing will be called Therma-Dure. Applications include suits, sportswear and casual clothes.

United is reportedly considering entering the lining field with its metallic insulating process to be called Uni-Therm. It expects to handle satins, taffetas and other lining weaves.

All the above processing methods and formulas are developments of United's own laboratory.

• Solophenyl Brilliant Blue BL

Geigy Company, Inc, New York, has added to their Solophenyl Line, Solophenyl Brilliant Blue BL, a new color said to give "remarkably bright shades of very light fastness on cotton and rayon."

Geigy states that the new color is notable for—

- . . Level dyeing as a result of slow drawing and very good migrating properties.
- . . Excellent union between cotton and rayon.
- . . Solid shades with irregular viscose rayon.
- . . High resistance to reducing agents; suitable for colored discharge prints but not for dischargeable ground shades.
- . . Suitable for crease proof finishing with only slight reduction in light fastness.

Solophenyl Brilliant Blue BL is especially recommended by the manufacturer for the dyeing of upholstery, automotive and drapery fabrics where good light fastness is necessary.

• Three New Trichlorobenzenes

A new group of high purity chemicals was announced on February 9 by A B Chadwick, President of the Solvay Process Division, Allied Chemical & Dye Corporation. Resulting from the successful operation by Solvay's research organization of a unique pilot plant for the separation of pure isomers, these three new products are 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene and 1,3,5-trichlorobenzene. Solvay is now in position to offer these products in experimental quantities with a purity range of 99 per cent or better, it is stated.

Although the three trichlorobenzenes are superficially related, each has its own individual chemical personality, thanks to the Solvay separation procedure. Some of the differences have already been evaluated in laboratory tests.

Tests of this kind are said to be quite significant since they show that the arrangement of the chlorine atoms on the benzene ring affects the nature and extent of the reaction with other materials, either chemical or biological, from which conclusions are drawn as to the exact mechanism of a reaction and the type of product required to produce it.

In addition to the physiological use, these new, pure isomers are expected to find many industrial and agricultural applications where mixed isomers are unacceptable. They are expected to find use as solvents in dyestuff synthesis and in the preparation of bactericidal soaps and solutions, as well as in the field of photographic and leather processing chemicals.

Solvay has scaled its pilot plant to provide adequate working samples of the three new trichlorobenzenes and has announced a willingness to cooperate to the fullest extent in providing technical data on properties and suggested uses to anyone interested in using or experimenting with them.

• Penetex S

Hart Products Corp, 1440 Broadway, New York, N Y, have added the new Penetex S to their extensive line of wetting agents. The product is a water-white clear liquid which is said to possess outstanding wetting-out action at a low cost. Using the Draves test with a 3g hook at 40°C, the following sinking times are reported with this product:

Concentration	Time in Seconds
%	
0.1	10
0.8	15
0.064	25
0.05	60

Penetex S is reported to be a readily soluble sulfonated condensation product useful in neutral solutions, solutions of alkaline builders, salts, soaps, organic acids and in dilute sulfuric acid.

A few examples of the penetrant's application, as cited by Hart Products, follow:

1) As a dispersing agent to dissolve dyestuffs, giving complete solubility and full color value.
2) For wetting-out in the desizing of rayon, cotton and acetate goods.
3) For wetting-out in dyeing hosiery.
4) For wetting-out cotton grey goods prior to bleaching and kier boiling.
5) As an additive to the dyebath on all types of machines and all kinds of colors where increased penetration and uniformity of shade are difficult to accomplish.
6) In dyeing operations in general to obtain increased penetration and greater uniformity of shade.

• High Boiling Phenols

High Boiling Phenols, allegedly the first product from coal hydrogenation to be offered to industry, is now available in tank car quantities, according to Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation. This new product is a semi-refined mixture of short-chain alkyl-substituted phenols with a distillation range between 230-270°C.

Compared with phenolic materials of similar boiling range derived from other sources, High Boiling Phenols is said to have a high degree of meta substitution, giving it greater reactivity with formaldehyde in the synthesis of thermosetting resins. It is stated that such resins can be made from High Boiling Phenols alone without the addition of m-cresol or phenol. It is further stated that a soluble oil that has good germicidal properties can be made from High Boiling Phenols, neutral oils and emulsifiers.

Its general reactivity suggests the use of High Boiling Phenols as an intermediate in the manufacture of phenolic resins (particularly for surface coatings having superior chemical, alkali, and soap resistance), phenolic dyestuffs, and in chemical syntheses where ring substitution on a phenol is indicated.

Since few of the phenols in this mixture are hindered, its hydroxyl groups react normally, thereby suggesting its use in making nonionic surface- active agents and organic and inorganic esters.

Carbide also suggests that High Boiling Phenols be tested for uses typical of cresylic acids, including preparation of mercerizing penetrants, oil demulsifiers, flotation reagents, dye assistants, dye fixatives, preservatives, and scouring agents.

• Citrazinic Acid Offered in Trial Amounts by Chas Pfizer & Co

Citrazinic acid, a poly-functional pyridine compound, is currently being offered in trial quantities by Chas Pfizer & Co, Inc, 630 Flushing Ave, Brooklyn, N Y.

The material, to be distributed by Pfizer under the name CZA, has never before been produced in quantity for commercial use.

A white-to-buff colored organic acid, the chemical is 2,6 dihydroxyiso-nicotinic acid. Pfizer's Technical Service Department, which is offering technical data and samples of the product, reports that its molecular grouping makes possible many chemical reactions, as well as the economical synthesis of new classes of substituted pyridines.

• Arnold, Hoffman Offers New Research Chemical

Arnold, Hoffman & Co, Inc, Providence, R I, has announced the availability of 9, 10-Dihydroxystearic Acid in research quantities.

The product is said to be adaptable for use in esters for plasticizers or waxes, in soaps for detergents or greases, in amides, sulfated products, ethylene oxide condensates and chemical syntheses, and other uses. It has a 175-180 acid number and iodine value of 6 max, a melting point of 80°-85°, and a mole percent hydroxyl of 165-175. Color ranges from white to pale tan.

• Low Cost Nylon Graphite Remover

Emkay Chemical Company, Elizabeth, N J has introduced a low-cost procedure for removing graphite from nylon lace.

Using Emkaterge A Powder and Emkaterge B, a clean tank, hot water and a mechanical stirrer of simple construction, the mill can prepare its own graphite cleaning solution in less than 30 minutes with a substantial saving in cost, it is claimed.

• Hilton-Davis Introduces New Line of Dyes

A new line of dyestuffs consisting of mixtures of Naphthols and Stabilized Diazos has been made available to the textile industry by The Hilton - Davis Chemical Co Division, Sterling Drug Inc.

Known as Spectrosols, the new dyes are companion products to the line of Spectrolene colors introduced by Hilton-Davis in 1951. It is stated that almost two years of laboratory research and thorough plant-testing, including actual mill runs, preceded perfection of the Spectrosol dyes.

The newly-developed mixtures are prepared on a "custom-built" basis for individual mills. Dyes are made up to mill specifications at the Hilton-Davis plant in Cincinnati; at the Blackman-Uhler Company plant in Spartanburg, S C, its southern representative; and at Hilton-Davis Sales Co, Boston, its New England representative. The purpose of this arrangement, it is explained, is to reduce to a minimum the loss of color value due to prolonged storage. It is claimed that the maximum brilliancy and color value of the dyestuffs are actually assured under the Hilton-Davis plan.

The Cincinnati firm announced that dozens of color combinations are available. Prices are reportedly based on the Naphthol-Spectrolene combinations used, with no extra charge for mixing. The Spectrolenes will continue to be offered to mills which find it advantageous to mix their own Naphthol-Stabilized Diazo solutions.

• Prufcoat Sealer P-25M

Prufcoat Laboratories, Inc, 50 E 42nd St, New York 17, N Y, has announced the availability of a new product, Prufcoat Sealer P-25M, with extensive application possibilities for vinyl and other heavy-duty protective coatings.

Consisting of selected synthetic resins and a special combination of leafing-type metallic pigments, Sealer P-25M air-dries by the evaporation of volatile solvents chosen to have a minimum effect on conventional oil paints, asphalt coatings, and similar materials. The Sealer is said to form an effective barrier film over all surfaces which might otherwise be lifted or wrinkled by the active solvents in vinyl and other synthetic resin coatings. In addition, it is said to be an excellent anti-staining sealer for use over such materials as tar, oils, pitch, etc.

Readers who desire further information should write for Prufcoat Technical Bulletin No. 023 on this subject.